THE IRON AGE

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Bad Luck?

THAT a black cat crossing one's path is an omen of bad luck is just another of those superstitions inherited from an earlier day . . . Many an old, mistaken notion fades in the light of improved knowledge. For example, not long ago it was widely believed that sheets able to defy rust could be obtained only by paying a high price . . . Then along came the famous tests of the American Society for Testing Materials, showing clearly that of all commercial steels and irons copper-bearing steel ranks first in rust-resistance, by a wide margin . . . Beth-Cu-Loy Sheets are made of copper-bearing steel. They have from two to two and one-half times the rust-resistance of ordinary steel sheets, yet cost only a trifle more. Wherever sheet metal is exposed to atmospheric corrosion, Beth-Cu-Loy is the sensible, economical sheet to use.

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MARCH 28, 1935

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"The Year's at the Spring"

"THE melancholy days are come," or "The year's at the spring"—the words of one of these poems may easily serve as the theme song for the present business situation. It is not hard to choose the quotation which suits better. Spring may be here, but American industry seems to be entirely oblivious of that important fact.

Melancholia hangs heavily over the industrial picture and the gaunt spectre of pessimism stalks through the land, casting its depressing shadow over practically all phases of activity. Yet this ghost exists largely in the realm of imagination. Its presence is not justified by actual business conditions.

Perhaps some of the current lack of confidence in the future is caused by the caution which comes from repeated disappointment. But on previous occasions, pessimism was based on the low state of business activity. It was well founded. And when such pessimism gave way to unrestrained optimism, the hopes and predictions of Governmental agencies and business leaders were often too roseate. They were not in accordance with facts. The bubble always burst and the resultant evaporation left everyone with a dark brown taste.

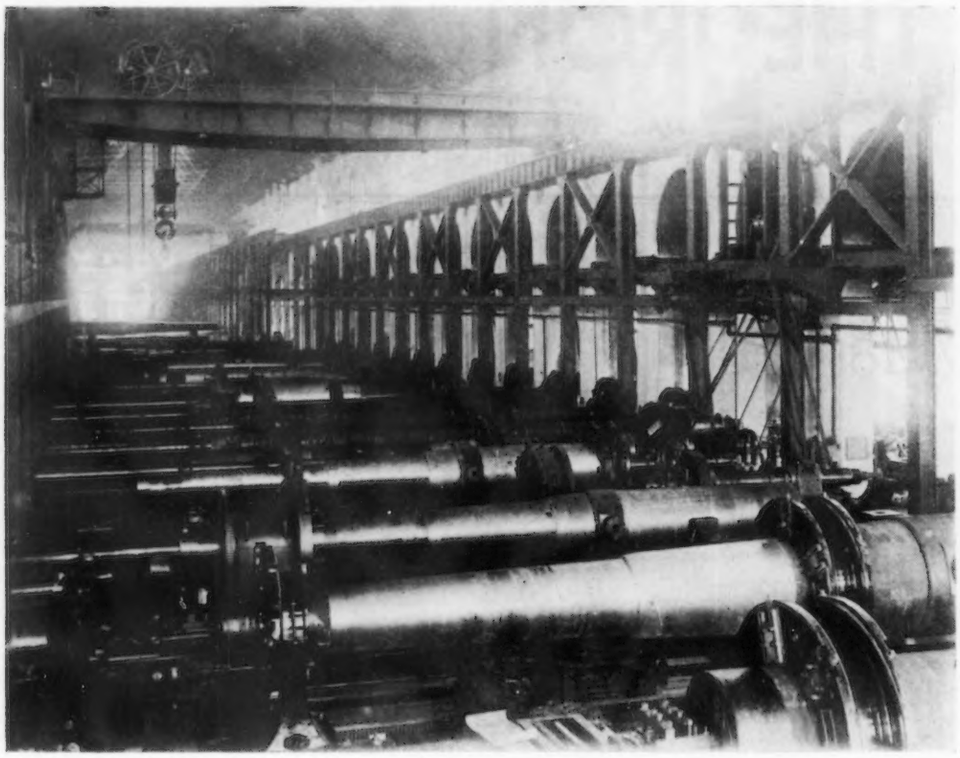
The present situation is almost unprecedented. For once, business activity is far ahead of business confidence. Steel production is holding between 45 and 50 per cent of capacity—far above the average of any of the last three years. Automobile output is at the highest level since 1930, with curtailment not yet in sight. Farm implement makers are very busy. The machine tool index for the current quarter will probably be the highest three months' average in four years.

The *Annalist* index of business activity in the week ended March 9, stood at 85.8, unchanged from the previous week, and compared with 83 and 82 respectively in the corresponding weeks of 1934. A sudden visitor from Mars, untutored in the odd intangibles which create business sentiment, would probably ask, "Why all the tears? Things don't seem to be nearly so bad as you people think them to be."

This observer would be right. The present despair is not justified. A full year's business is not going to be crammed into a single quarter. Definite progress toward recovery has been made in the last two years, and this progress will continue despite the antics of a confused Congress with a slightly bewildered leadership. Two years of experimentation have proved that the forces of economic advancement are too strong to be side-tracked, except for brief intervals, by inexpedient political opportunism.

T. H. GERKEN

News Editor, The Iron Age



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VIEW of the heavy seacoast cannon shop at the Watervliet arsenal, West Troy, N. Y. It would be difficult to find private plants capable of producing this sort of military "capital equipment."

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Cost Keeping at Manufacturing Arsenals

o o o

By MAJOR GENERAL
W. H. TSCHAPPAT
Chief of Ordnance, U. S. Army

o o o

I HAVE read with interest the article by Mr. George W. Alcock under the title "Puncturing the American 'Munitions Trust' Bogey," in the issue of THE IRON AGE dated Jan. 24, 1935. Mr. Alcock indicates that he has given the subject considerable study and there are excellent features in the article, but some of his statements pertaining to the Ordnance Department of the Army indicate that he voices the widespread impression that Government plants are run without any attempt at system or control of costs.

He makes this statement:

"Any one with the most elementary knowledge of manufacture knows two things, first that quantity production is impossible of achievement in any plant operated by the Government, and, second, that no Government agency has the slightest idea of what elements properly constitute cost."

If this statement is meant to apply to the manufacturing activities of the Ordnance Department, it is not correct. Quantity production was achieved at all six of our manufacturing arsenals during the World War period. In this connection Mr. Alcock's attention is invited to Benedict Crowell's "American Munitions," which is a complete report of the then Director of Munitions, showing the quantity production achieved by both Ordnance arsenals and private industry. A visit to the Ordnance manufacturing arsenals will disclose quantity production methods in use where peace-time orders for the product are sufficient to warrant such use.

Mr. Alcock quotes the testimony of General Peirce before a Congressional Sub-committee on November 28, 1922, as follows:

"Military overhead at the six manufacturing arsenals of the Ordnance Department as computed on Jan. 25, 1916, is as follows:

Frankford Arsenal 12 per cent
Rock Island Arsenal 13.77 per cent
Springfield Armory 16.15 per cent
Watertown Arsenal 18.66 per cent
Watervliet Arsenal 21.51 per cent
Picatinny Arsenal 22.03 per cent"

He then goes on to say:

"Can any manufacturer imagine operating a plant of the size and with the expensive equipment necessary to produce explosives or heavy ordnance at the overhead figures given?"

The answer to this question, of course, is "No." Regrettable though it may be, the Ordnance arsenals do not operate on any such overhead. What is above referred to as "military overhead" is a burden which includes:

Interest on capital investment;
Depreciation;
Annual repairs not directly incident to manufacturing activities;
Administration cost;
Hypothetical insurance cost;
Pay and allowances of officers and enlisted men of the army actually engaged on production as distinct from duties pertaining to supply and instruction.

In addition, it includes a War Department burden of 3.6 per cent, which is the share of the total expense of the War Department in Washington, which may be classed as incident to Ordnance manufacturing activities.

MANY of us have had the impression that Government manufacturing agencies do not use the same yardstick of cost that has to be applied, of necessity, in private industry. We welcome, therefore, this article by General Tschappat, in which he throws light on the ordnance cost picture.

To disprove Mr. Alcock's statement that Government agencies have no idea of what elements properly constitute cost, let me describe in as few words as possible the cost accounting system used by the Ordnance Department at all of its establishments.

Funds are appropriated by Congress and apportioned to the Ordnance Department for the financing of projects contained in an approved program. Allotments of funds are made to the arsenals, based on their estimates of the cost of items assigned to them for production or purchase. Purchases are, of course, made through competitive bidding.

The charges which are made against an allotment on a job order are, first, direct labor, second, direct material, and, third, a shop expense charge which is collected as a percentage of direct labor and which is limited in expenditure to the following:

a. Indirect labor.
b. Indirect material and commodities.
c. Labor and material required to maintain in an efficient condition existing facilities and utilities which are actually in use for manufacturing purposes.
d. The procurement or manufacture of machinery if approved by the Chief of Ordnance.
e. The extra costs of manufacture arising from the replacement of defective material when the quantity of such material exceeds that which may be reasonably expected in its careful production.
f. Payments made to employees for seven legal holidays and leave of absence with pay (fifteen working days).
g. Materials which are converted into manufactured articles, when the quantity used for one order is so insignificant in value that the expense of keeping account of it otherwise is greater than the information so obtained would warrant.
h. Advertising for help for manufacturing purposes.
i. Cash rewards for suggesting improvements or economy in a process.

These three charges account for

INTERIOR of seacoast erecting shop, at Watertown, Mass. Here are made the mounts for our seacoast defense cannon.

every penny of the funds specifically appropriated by Congress for the manufacture of the items in question. The shop expense percentage at the arsenals varies according to the amount and kind of work going on at the particular plant. At the present time it is running as follows:

Frankford Arsenal	65 *per cent*
Rock Island Arsenal	95 *per cent*
Springfield Armory	100 *per cent*
Watertown Arsenal	93 *per cent*
Watervliet Arsenal	90 *per cent*
Picatinny Arsenal	150 *per cent*

We call the sum of these three charges the appropriation cost.

It is, of course, to be distinctly understood that the preceding does not constitute the total cost to the United States. To obtain the total cost we must add the percentages improperly referred to above as the "military burden." What might be called the "military" expense, viz., pay of military personnel actually disbursed from another appropriation, is a very small percentage of this arsenal and War Department burden, the major items of which are listed above. It is to be noted that one of these, interest on capital investment, is not generally included as a part of the cost by commercial concerns, while on the other hand taxes, an item of cost in the commercial world, are not included in our total cost. The reason for the latter is that the Federal Government would not receive property taxes from these plants if privately owned.

Published price lists of Ordnance equipment are obtained by adding the arsenal and War Department burdens to the appropriation cost and represent to a reasonable degree of accuracy the total cost to the United States.

As a simple example of the pricing of an article manufactured at Frankford, the following is submitted:

AT LEFT

VIEW of the instrument room at Frankford arsenal, Philadelphia, where range finders, periscopes and other precision instruments are made.

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BELOW

TANKS under construction in one of the departments of the Rock Island arsenal.

THE Springfield armory, at Springfield, Mass., is the home of the noted Springfield rifle which is the standard in United States small arms. This plant is organized on a strictly production basis.

Direct labor	$ 1.00
Direct material	.50
Shop expense percentage applied to direct labor 65%	.65
Appropriation Cost.	2.15
Burden factor applied to appropriation cost 12%	.258
Total Cost to Gov't	$ 2.408

Under the bookkeeping and cost accounting system in use at arsenals it would not be possible for an establishment to include only direct charges in its costs.

One of the primary purposes of operating our arsenals is to determine accurate costs of articles not ordinarily made by private concerns. Costs thus determined are the basis of estimates for future manufacture and purchase. Costs, of course, to be of value must be based on quantity production.

Other statements in Mr. Alcock's articles are subject to question. Contrary to his statement, the Browning machine gun was not put in production until it had been thoroughly tested, and up until that time the various types of machine guns used by our Allies were purchased in great numbers and issued to our troops.

The Springfield Rifle, Model 1903, was not considered obsolete in 1917 and is not considered obsolete today. In fact, it is still considered the best military rifle in the world. It would have been folly to ask private plants to manufacture the Springfield when they were already equipped for the Enfield, which could be used with slight modifications. The production of the Springfield was continued at Springfield Armory and Rock Island Arsenal throughout the war.

Mr. Alcock is in error when he says that the 4.7 gun was our standard field gun in 1918. Neither was it used in the Spanish-American War. The 3-inch field gun was our standard field gun. Any type of gun or ammunition would have been just as strange to our American manufacturers as the French type, which Mr. Alcock says was so strange to them.

Our arsenals are utilized to the fullest extent within appropriated funds in research and development pertaining to Ordnance material. In this way personnel both military and civilian are in constant training to meet the needs of the country in an emergency. This personnel is the backbone of our instruction, inspection and manufacturing activities in time of war.

While enough work should be given to the Ordnance arsenals so that they can operate efficiently and keep our specialized arts alive, it is equally important that private industry be kept interested so that it may have some experience in our line when war comes. For many years we have advocated educational orders to manufacturers. Several bills have been introduced into Congress to amend the National Defense Act so that this would be possible, but to date no such bill has been passed. The following is contained in the last bill introduced:

> *"Provided, That the Secretary of War may authorize the placing of educational orders for equipment, munitions and accessories needed in the military service with commercial concerns to the degree that is considered by him as being necessary to familiarize commercial factories with munitions manufacture and to advance the industrial war plans of the War Department, and in placing these educational orders the competitive bids which in his opinion best secure these results may be accepted; and he shall make statement of his action under this provision in his annual report."*

More than 90 per cent of our supplies are procured commercially in a major emergency, and the passage of the above quoted bill would be of great help to industry in getting into early production.

Electrical Aids to Precision Rolling

THE purchaser of steel —particularly strip and sheet — is becoming more and more exacting in his requirements as to gage, quality, and finish. To help the mill operator meet these demands more easily the electrical industry has developed a number of devices and systems of control, in addition to the main mill drives themselves. A few of these developments are described in this article.

Selsyn devices are by no means new. One of their first commercial applications was on the control boards for the locks of the Panama Canal. There they are used to reproduce in miniature on the control board the exact motions of the lock gates, water levels, guard chains, and valves. However, their introduction into some branches of steel mill service is quite recent.

A Selsyn instrument is very like a miniature bi-polar rotating-field alternator. The rotor has a single-phase shuttle-type winding, while the stator has a distributed three-phase Y-connected winding. Electrically the Selsyn device acts as a transformer, with the rotor excited from a single-phase source. The magnitude of the voltages induced in the three elements of the stator winding depends upon the angular position of the rotor.

The simplest Selsyn system consists of two instruments with rotors excited from a single-phase source, and with the terminals of one stator connected to those of the other. If both rotors are free to turn, they will take up a position such that the stator voltages are of balanced magnitude and displacement. If one rotor is turned with respect to the other, the voltages of the two instruments will be unbalanced, causing a current to circulate through the stator windings. This will provide a torque tending to turn the rotors to a position such that the stator voltages are again balanced, or, as we say, they are in "correspondence."

ELECTRICAL devices and systems of control are helping rolling mill operators to meet more exacting requirements as to gage, quality and finish. Selsyn units are used in connection with mill screwdowns, in a wrap counter on the reel of a cold strip mill, and in a length-measuring device applied to a hot sheet mill. Electric gages have been applied to continuous gaging of cold-rolled strip, and a cold rolling mill draft gage employing a small generator on the entering and the delivery guide rollers is in successful operation. Another group of electrical aids, namely electron tube devices, will be described by Mr. Winne in Part II of this article.

Thus, if one instrument, the "transmitter," is rotated, the rotor of the "receiver" tends to follow its motion exactly. The amount of torque available is roughly proportional to the sine of the angle between the two rotors.

A Selsyn differential is similar to a simple Selsyn instrument except that its rotor has a distributed three-phase winding. A simple differential Selsyn system consists of two standard units and a differential. The stator of one unit is connected to the stator of the differential, and the stator of the other unit to the rotor of the differential. The rotors of the two standard units are excited from a common source.

For one position of all three units, the impressed and induced voltages in the rotor of the differential will be equal and no current will flow. Any deviation from this position will cause current to flow and torque will be exerted tending to restore correspondence. If one rotor is held and another is rotated, the third rotor will follow the rotation of the second. Any one unit will always indicate the angle between the other two.

One of the simplest applications of a Selsyn system is to give remote indication of movement or position. For example, a Selsyn transmitter is geared to the motor driving a blooming mill screwdown. The receiver is mounted in the mill pulpit and connected to an indicating dial, so the roller has the screwdown indicator right in front of him instead of out on the mill.

Selsyn units are also used on automatic control systems for screwdowns to transmit the motion of the screw to the controlling limit switch, thus permitting the limit switch to be mounted in the control room where it is readily accessible for adjustment or servicing.

For a reversing cold strip mill screwdown indicator, the Selsyn receiver may be connected to a

# of Steel—Part I

BY HARRY A. WINNE
Industrial Engineering Department, General Electric Co.

Selsyns—Electric Gages—Draft Gages

"counter" of the multiple-roller type, with the gearing so arranged that a movement of the screw amounting to 0.0001 in. changes the reading of the counter by one unit. Then the counter can be so set that its reading indicates directly the roll opening in ten-thousandths of an inch. Several such applications have been made.

Another use of the Selsyn instrument and counter combination is as a wrap-counter on the reel of a reversing cold strip mill. In the operation of these mills, the metal passes back and forth through the mill, unwinding from one reel as it winds on the other. After the first pass, it is very important that the mill be stopped before the tail end of the coil leaves the reel. On the other hand, to reduce scrap, it is desirable that the length of the unworked piece on each end of the coil is kept at the minimum. To assist the operator in knowing just how many wraps of strip he has on each reel—in other words, how near to the end he is working—a Selsyn transmitter is connected to each reel and a receiver to each of two counters. Each counter is set at zero just as the strip starts on its reel. As the strip winds up, the counter shows the number of wraps, but what is more im-

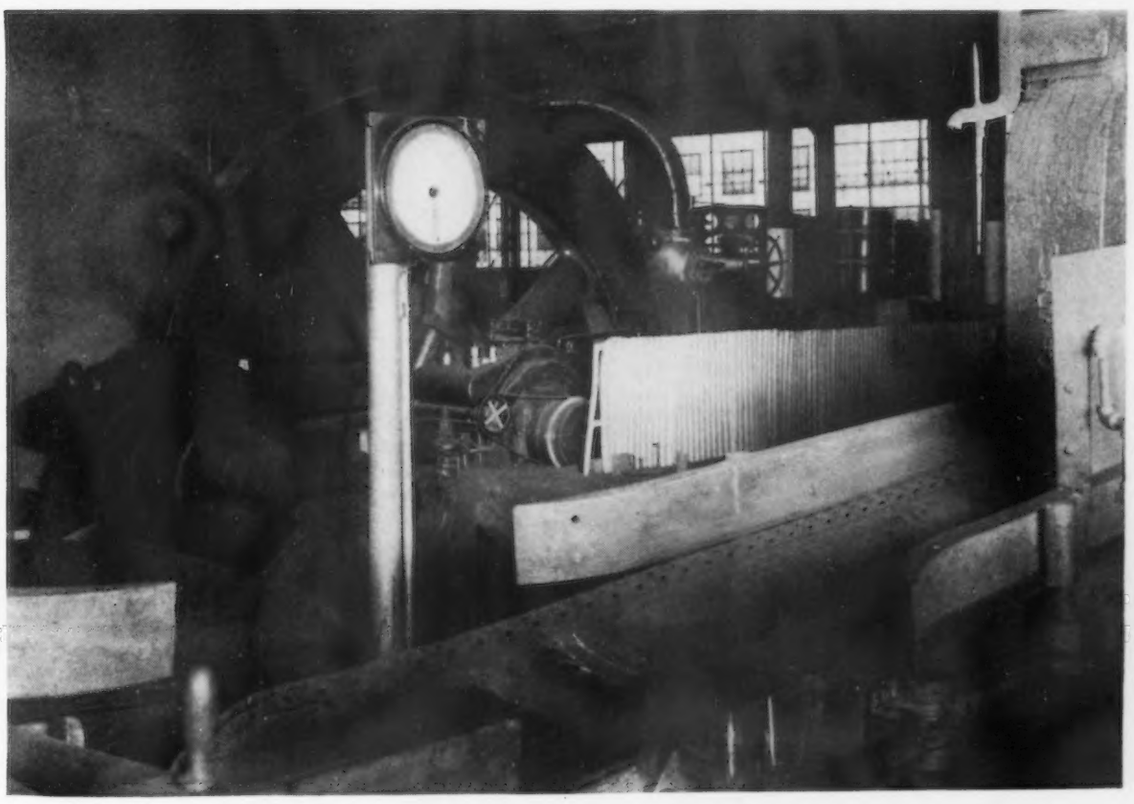

FIG. 1—Sheet mill pack length measuring equipment

portant, when the mill is reversed and the strip unwinds, the counter reading decreases and when it approaches zero the operator knows he must stop the mill. Such an equipment reduces scrap losses and saves mill rolls.

A length-measuring device involving Selsyn equipment has been successfully applied to a hot sheet mill equipped with automatic catcher tables. A Selsyn transmitter is geared to the mill so that the number of revolutions it makes in any given time is proportional to the peripheral travel of the rolls during the same time. Mounted in a suitable instrument case is a Selsyn receiver, connected through a small magnetic clutch to a pointer which indicates the length of the sheet, or pack, being rolled.

The clutch between the receiver and the pointer is controlled by the flag switch on the catcher table, which is actuated by the sheet as it comes through the mill. When the front end of the sheet operates the flag switch, the clutch is energized, connecting the pointer to the Selsyn receiver, which is rotating continuously at a speed corresponding to the sheet speed. The pointer begins to travel over its scale and continues to do so until the tail end of the sheet passes the flag switch, which releases the clutch. The position of the pointer at this instant is an indication of the length of the sheet. The device can be arranged so that either the pointer resets immediately or it can be held in the final position for a short time and then automatically reset.

The length measuring equipment increases production on a mill by eliminating the necessity for actually stopping the sheet to measure its length. It also improves the accuracy of rolling, insuring more uniform length and therefore gage.

A comparatively new tool for precision measurements in the manufacture and fabrication of steel and other metals is the electric gage. An electric gage equipment consists of a "gage head" in a suitable mounting, a "power unit," and a microammeter calibrated to indicate in ten-thousandths of an inch.

A cross-section of a gage head is shown in Fig. 2. The head comprises two adjustable coils with a steel armature which floats midway between them. The armature is pivoted at the end opposite the coils, and is held in continuous contact with the end of the spindle, the other end of which rests on the work being gaged. Thus the armature takes up a position, between the two coils, which will vary with any variation in the dimension which is being checked.

AT RIGHT

FIG. 2—Sectional view of electric gage head.

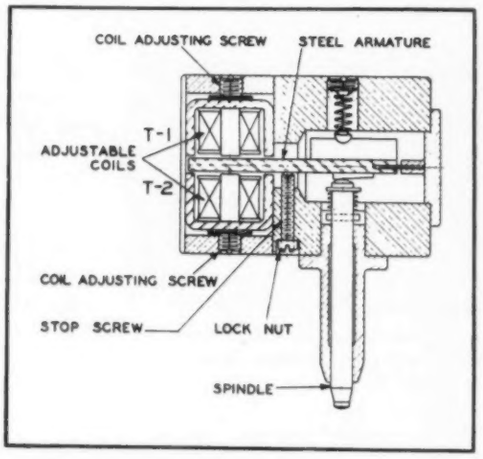

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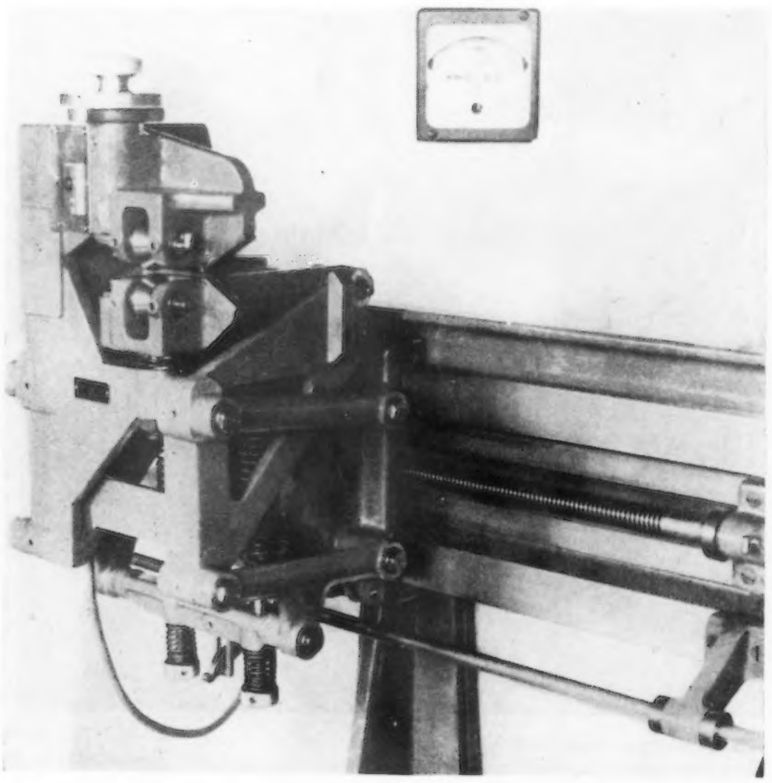
FIG. 3—Electric gage for continuously gaging cold strip steel.



The two coils in the head are connected in an electrical bridge circuit with two coils in the power unit; this bridge is fed from a 60-cycle, 110-volt circuit, and the microammeter is connected across the bridge in series with a rectifier. The rectifier permits the use of a d-c. microammeter which has a uniformly divided scale. It is evident that any movement of the armature in the head will change the relative reactances of the two coils, thus unbalancing the bridge and causing a change in current through the microammeter, resulting in movement of the pointer.

A tremendous magnification is obtained between the movement of the spindle and that of the pointer. As usually calibrated, a spindle

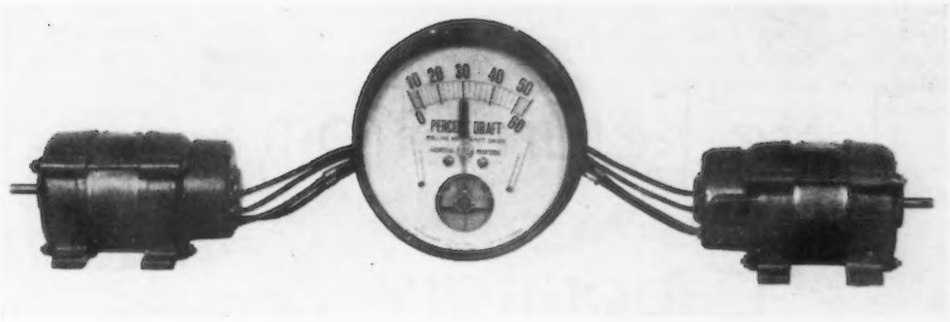


FIG. 4—Rolling mill draft gage equipment.

movement of 0.0001 in. will result in a pointer movement of 1 in.—a magnification of 10,000 to 1. It can be built so that spindle movements of 0.0001 in. will give pointer movements of from 0.25 to 3 in.

The electric gage is essentially a comparator, and has found its greatest use in checking the dimensions of machined parts, such as those of automobile engines, refrigerator mechanisms, etc. It eliminates the human element always present in micrometer measurements. A graphic record of measurements can be secured by using a photoelectric recorder, and the indicating instrument can be equipped with contacts so that a signal can be given whenever a definite tolerance is exceeded.

Continuous Gaging of Cold Strip

The electric gage has been applied with marked success to the continuous gaging of cold rolled steel strip. For this purpose, the Pratt & Whitney Co. has developed the mounting shown in Fig. 3. The strip passes between two hardened steel rolls which are forced together by springs. The movement of the axis of one roller with respect to that of the other actuates the spindle of a gage head. The mounting is cleverly arranged so that a line through the axes of the two rollers is always perpendicular to the plane of the strip, regardless of the change in angle between this and the horizontal as the diameter of the coil of strip on the reel increases. Thus there is now available a means of continuously and accurately gaging the strip without stopping or slowing the mill.

Furthermore, a continuous record of the thickness of an entire coil of strip can be obtained by using a photoelectric recorder in connection with the gage.

Not only that, but the indicating instrument can be equipped with adjustable contacts which can be connected to the screwdown control circuit in such a way that if the thickness of the strip varies by more than a predetermined amount, the screws will automatically be adjusted to bring the thickness to the desired value.

The continuous electric gage is a real aid in the successful operation of the precision cold rolling mill. It helps to increase production by eliminating slowing down for gaging, and improves the quality of the product. Over 25 continuous gages are now in service on cold strip mills.

There are considerable difficulties to be overcome in applying the continuous gage to hot strip mills, and so far as the author is aware, this has not been done successfully as yet.

Indicating Roll-neck Pressure

The electric gage can also be used to indicate the screw pressure on the rolls of a mill. If a cylindrical steel block is placed between the screw and the roll bearing, the block will be compressed and its diameter will increase as the pressure increases. A gage can be mounted so as to measure this diameter, and the instrument can be calibrated to indicate pounds pressure on the blocks. Again a continuous graphic record can be secured if desired.

While all cold strip mills are equipped with screwdown indicators, the indicator does not always give a correct measure of the draft being taken, because of the spring of the rolls and housings. If the mill is equipped with rollers over which the strip passes when entering and leaving the mill, it is obvious that the r.p.m. of these rollers will be proportional to the entering and delivery speeds of the strip.

The ratio of the delivery speed to that of the entering speed is, of course, the same as the ratio of the strip thickness before and after passing through the mill. We can couple to each of the guide rollers a small generator, the voltage of which will be proportional to the roller speed. Then we can connect the armatures of these two generators to the coils of an instrument which will indicate the ratio of the two voltages, and calibrate this instrument in "Per Cent Draft."

Such an equipment gives a continuous indication of the percentage reduction in thickness. One such installation is in successful operation.

The foregoing descriptions of electrical apparatus are of necessity somewhat brief and sketchy. About many of them, an article much longer than this could be written. If the reader desires more information on any of the equipment mentioned, he may find it in one or more of the papers listed in the following bibliography.

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Late Returns from Laboratory and Mill

° ° °

By T. W. LIPPERT
The Iron Age, New York

° ° °

Hommelaya, A New Enameling Process

MANY enameled products have sheet steel as a base material; this sheet is immersed in or sprayed with a "frit," which is really a form of glass, finely ground and suspended in a liquid. After the liquid evaporates the frit is evenly deposited on the metal, and the product is subsequently fired.

It is of extreme importance that a firm bond exist between this first coat and the steel. To intensify the adhesion, chemicals are used which act similarly to a flux in the welding of metals. By present enameling methods these chemicals give the "ground" coat either a black or very dark blue color, and consequently two additional coatings and firings are needed to prevent this darkness from showing and altering the surface color of the enamel.

A new and basically different process has been developed by the Mellon Institute of Industrial Research, Pittsburgh, and it is said to be simpler and cheaper than present methods of producing porcelain enamels. This Hommelaya procedure achieves a great degree of opacity and therefore maximum depth of color for both white and pastel tints, but only two coatings and firings are necessary in comparison with the three generally required. This follows from the fact that the first coat is white or light in color; therefore only one additional coat is needed to secure a true color tone.

Several commercial trials of this process are said to have proved the following advantages: (1) a better product, less liable to craze or chip, (2) an important saving in cost materials per unit, (3) a decrease of 33 1/3 per cent per unit in fuel and labor costs incidental to firing, (4) a 50 per cent increase in productive capacity of present kiln equipment, and (5) a smaller number of rejected units due to the elimination of the hazard of the third firing.

* * *

Yellow Brass Solution Plates Bright

AN English firm recently encountered the problem of producing a very bright brass plate

finish. The solution normally used gave a beautiful finish, but it was found that discrete additions of arsenic even further brightened the plate. The ordinary solution consisted of one gallon of water to which was added 5½ oz. of sodium cyanide, 4 oz. copper cyanide, 1 oz. of zinc cyanide, and 2 oz. of soda ash. The plate produced by this bath was considerably enhanced in luster in the following manner: 2 lb. of caustic soda was dissolved in ½ gal. of cold water; when dissolved, 1 lb. of white arsenic was added little by little, during which time a glass rod was used to constantly stir the solution; after the arsenic was dissolved, the solution was diluted with water to make a total of one gallon. This was considered a stock solution. When an addition to the plating bath was made, one ounce of this stock solution was taken and mixed with 4 oz. of 26 deg. ammonia and 12 oz. of water, which was considered enough for about 100 gal. of the plating solution. Should the plate not be bright enough even after this addition, another small quantity can be added. However, the addition of an excess of this brightening mixture should be avoided.

* * *

Progress of Fatigue Is Determined

THE phenomena of fracturing of metals under varying stresses are known as fatigue failures. Since Woehler gave the first basis for scientific design of structures, there have been many important investigations of this type of failure. But most of this work has concerned itself with so-called fatigue limits or endurance limits.

Only a few investigations have been made of the manner in which fatigue of materials progresses during the course of repeated stresses. New data of this nature have important practical values. Consequently the results achieved by Fumio Oshiba, of Tohoku Imperial University, are most timely.

His study covered Swedish steels containing 0.2, 0.3, 0.4 and 0.7 per cent carbon, and the experiments were sufficiently extensive to establish (1) the progress of fatigue under repeated impacts, (2) recovery from fatigue by heat treatment, and (3) the relation of fatigue cracks and degree of fatigue.

Notched and prepared specimens were subjected to 70 repeated impacts (blows) per minute on a special machine. The impact energy of each blow was constant throughout each test. Identical specimens were fatigued by various numbers of blows and then broken on a Charpy machine. Thus the degree of fatigue at different stages of impacts was determined by the use of Honda's formula.

Fig. 1 gives a typical result. As the number of blows increases the impact value (from Charpy machine) d e c r e a s e s slowly, then quickly, and finally again slowly until ultimate failure. The degree of fatigue *increases* in a similar manner. Thus there are three stages of fatigue failure.

The duration of each of the three stages is affected by the stress intensity due to repeated impacts as well as shape of the specimen. As the stress intensity (energy of blow) diminishes, each stage becomes larger and more discernible. In general, the first stage for round specimens and the third stage for rectangular ones are largest.

The higher the carbon content in the steel, the greater the degree of fatigue in the early stage of impacts and the smaller in the later stage. That is, *a high-carbon steel is more liable to become fatigued than a low-carbon steel in the early stages of impacts*, but it is more resistant in the later stage.

Heat treatment has considerable influence on recovery from fatigue, often giving as high as a 10 per cent recovery. Although this recovery can take place during any of the three stages, it is most conspicuous late in the second or early in the third stages.

It was found that the growth of fatigue cracks controls quite closely the degree of fatigue. The rapid increase of fatigue degree in the second stage results from this growth of cracks, but the degree of fatigue changes slowly in the

FIG. 1—Effect of repeated stress on 0.7 per cent carbon Swedish steels. Impact energy of each blow equaled 7 kg. cm. Note that both the Charpy impact value and degree of fatigue progresses first slowly and then quickly, but afterwards again slowly until the specimen breaks down.

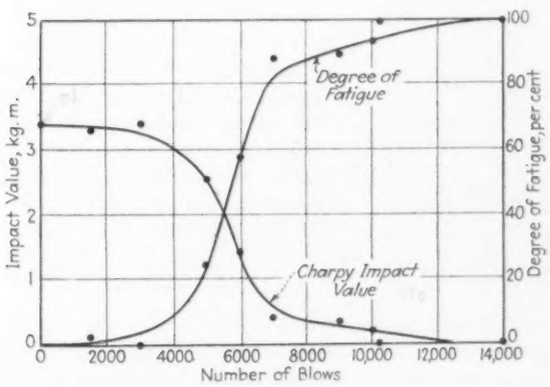
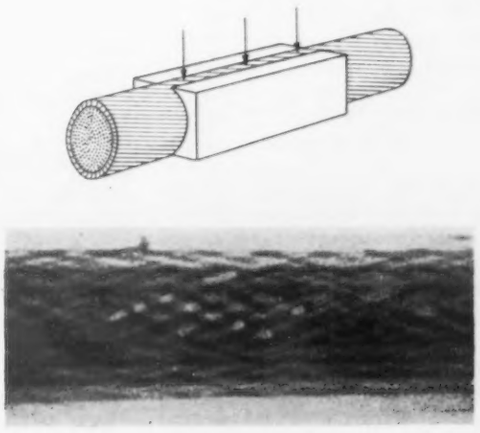


FIG. 2—German investigators clamp iron shells on steel cables when X-ray examinations are necessary. The upper view shows the procedure, and an exograph of a 50-mm. cable is shown below. Note the two inside breaks in the cable.



last stage despite the uninterrupted lengthening of the cracks.

* * *

Magnesium Alloys Investigated

THE Department of Scientific and Industrial Research (British) has just issued a report on its investigations of magnesium alloys. At the National Physical Laboratory considerable progress was made during the year on this type of material. A summary of the data shows that one alloy containing 8 per cent cadmium, 2 per cent zinc and 6 per cent aluminum has an ultimate tensile strength of 26 tons per sq. in. and an elongation of 10.5 per cent for a rolled rod. The entire report covers many investigations of the properties of magnesium alloy specimens which were produced by rolling, pressing, extruding, and spinning, both in the "as rolled" and heat-treated conditions.

Both thermal and microscopic methods were used to investigate magnesium-nickel alloys containing up to 50 per cent nickel. The solid solubility of nickel and solid magnesium was found to be less than 0.1 per cent, and the exploratory work showed that *this type of alloy is unlikely to have useful mechanical properties.* Experiments were performed to find whether an adherent coating of cadmium can be produced on a magnesium alloy by rolling strips of the two together. The first trials were successful, and the coating appeared to be a good basis for the electrodeposition of further coatings. But unless extremely thin coatings can be achieved the advantages gained may be outweighed by the disadvantages of an increase in specific gravity.

* * *

Stainless Steel 0.004 in. Thick

ATTENTION of thin stainless steel some months ago elicited so many inquiries that additional information should be of great interest to the trade.

The principal maker of this product is the American Sheet & Tin Plate Co. The 18-8 grade has been cold rolled as light as 0.004 in. in widths up to 24 in. However this thickness at present can not be made on a commercial basis. Even in thicknesses of 0.006 in. the rolling is still of an experimental or developmental nature.

FIG. 3—Defective rotary furnace lining. The lamination has been caused by the use of a wrongly shaped ramming tool.

The makers believe that the current commercial limit for their equipment is 0.008 in. for the 18-8 grade. The tensile properties of this material varies from 80,000 lb. per sq. in. in the annealed state up to 150,000 lb. per sq. in. in the cold-worked state. It has been found impractical to furnish the 0.006-in. material in the dead soft condition, but this thickness "as rolled" displays an ultimate strength of approximately 150,000 lb. per sq. in., a yield point of approximately 135,000 lb. per sq. in. with an elongation of about 15 per cent.

Stainless steel in these thin sections retains all of its rust-resisting properties. It is expected that a large potential market will develop in the aircraft industry where the material will be used for fabricating stress members and also wing covers. This thin material has already found application as the metal facing material for ply-wood, and has found experimental application for valve die frames.

* * *

X-Raying Steel Cables

THE inner corrosion of wire cables can best be detected by X-raying. The usual procedure, however, is somewhat troublesome inasmuch as portions of the cable must be immersed in an absorbing liquid in order that failures can be more easily recognized.

A variation from this usual method, recently reported in *Stahl und Eisen*, makes use of two steel shells which snugly fit the cable. The medial section of the wire rope is not covered, but on either side the decreasing thickness of the rope is compensated for by the increasing thickness of the attached pieces. The shells are tightly clamped on; consequently the contact area does not show in the exograph. By using this method, a length of cable can be quickly and easily examined, and the results are equally satisfactory whether cables with or without hemp cores are used. It is also believed that there is less absorption and scattering of the X-rays by using this clamp method, as compared with the liquid bath procedure.

Fig. 2 gives a schematic drawing of the method of clamping and the direction of the X-rays. The exograph below is that of a 50-mm. closely wound cable which was known to have internal breaks. The tube used was rated at 150 kv. and 4 ma., and the distance from the cable was 43 cm. A 1-mm. tin layer was put in between the cable and casette to filter out the scattered rays. This view clearly shows the uniformity of the exograph; two internal brakes are discernible. These failures were very clear on the positive print, but were accentuated in order to reproduce satisfactorily.

* * *

Bright Nickel Plating Arouses Much Interest

EVER since its introduction in this country, the process of plating bright nickel has engendered considerable inquiry. This process permits of the formation of a dense, highly lustrous, and impervious deposit of nickel, and the surface may be used either as a finish coat or as a base for a deposit of chromium or other metal. There is no necessity for polishing. Therefore the attendant danger of removing the coating or thinning it excessively is avoided.

The baths for this purpose were patented by Max Schlotter on Sept.

(CONTINUED ON PAGE 88)

Attractive Finish Helps Metal Products Sales

34—Tumbling and Burnishing

MANY manufacturers are more familiar with the range of possibility of polishing and buffing operations than of tumbling and burnishing. Barrel operations are often associated with rough work as a substitute perhaps for sand blast or snagging. When a high polish on delicate parts is desired, a barrel process may not be considered, yet delicate edged tools are now being prepared by burnishing for that exacting process, chromium plating. Often a plant manager will find that the addition of a barrel operation in his finishing sequence will improve his sales. Some of the features affecting selection of equipment, abrasive and process are outlined in the accompanying article.

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By HERBERT R. SIMONDS

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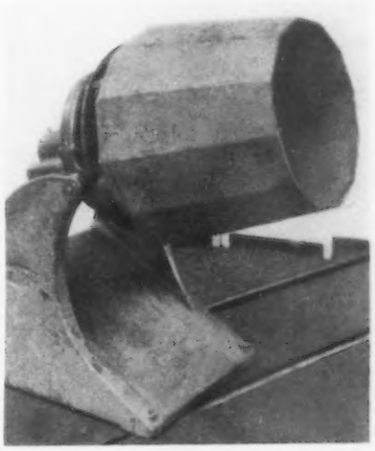
ON a mass production basis the finishing of small metal parts by barrel burnishing is frequently less expensive than by buffing, and since in some cases one process can be substituted for the other without sacrifice of quality, it is important for the manufacturer to know the possibilities and characteristics of both. The problem of selection is not simple, as seemingly insignificant differences in the nature of the product or of the final finish may swing the advantage from one method to the other.

The tumbling barrel, long recognized as an important adjunct in the cleaning departments of foundries, has comparatively recently invaded successfully such shops as those that make surgical instruments, delicate scissors, safety razors, needles and thimbles.

In foundries the operation is usually known as tumbling, with the action mostly that of abrasion. By changing one or more of the many variables involved, the process may be gradually changed to burnishing, where the action is largely that of peening.

The various methods of using a barrel for finishing are difficult to catalogue or define, as one method may overlap another. Thus by introducing an acid in with the abrasive, a tumbling operation may become a descaling process.

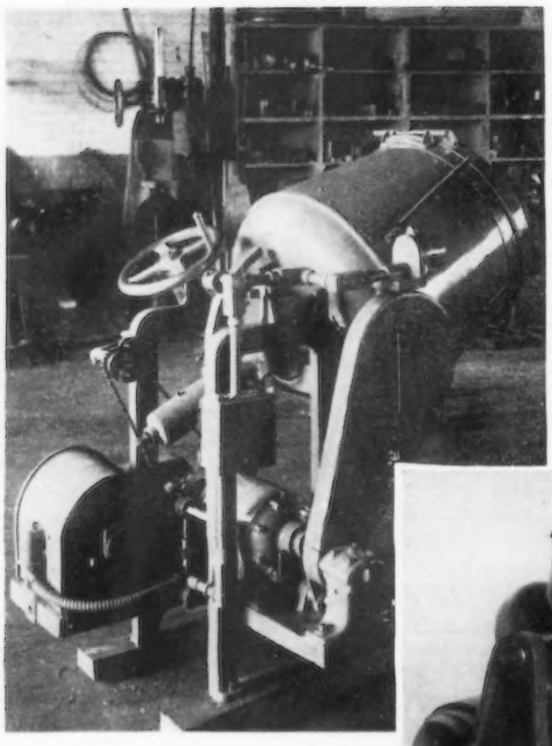
R. W. Mitchell, of Magnus Chemical Co., speaking of the use of the barrel, has said: "Tumbling might be compared to snagging or grinding, rolling is analogous to polishing or 'cutting down,' and burnishing corresponds to buffing. Tumbling removes sand, 'skin,' scale and fins from castings, and scale from forgings. Rolling removes flash and burrs, wire edges, pits, rough spots, scale and rust, and cuts down a metal surface to an even and uniform condition. Both processes, unfortunately, also remove corners and round off edges. Barrel burnishing puts a lustrous finish on a clean and smooth, but dull metal surface."



A RECENT simple tilting barrel has the motor self-contained with the barrel support

Courtesy The Baird Machine Co.

The full possibilities in the use of the tumbling barrel are seldom appreciated. Also, its shortcomings and the need for careful adjusting of variables are often overlooked. Assuming that a barrel of good design is available, the following variables then must be considered: speed, temperature venting, nature of abrasive (this varies all the way from a substance like carborundum, which has a cutting action, to steel balls, which have a peening effect), amount of load compared to size of barrel, amount of liquid used, and relative specific gravity of work and abrasive.



AT LEFT

THIS type of barrel unit is equipped with a variable speed mechanism and an enclosed barrel

Courtesy The Baird Machine Co.

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BELOW

A BENCH tilting tumbler of this type is convenient for miscellaneous burnishing of small parts

Courtesy The Baird Machine Co.

In a foundry, broken up slag is often an excellent material to use in a tumbling barrel. The slag particles, as they break up, present ever-new sharp surfaces and the material has what is called a progressive action. Some of the harder materials, such as carborundum, may not have this progressive action, in which case cutting efficiency lessens as the material is used over and over again.

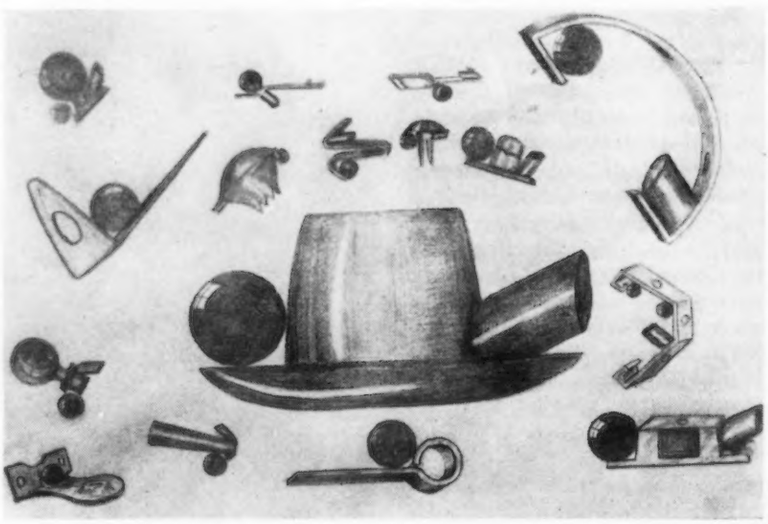
For most small part burnishing, the shape of the abrasive particles is particularly important as irregularities of surface may be out of reach of round balls and yet may be properly polished with stars or irregular shapes. Special consideration must be given to the polishing material in a tumbling barrel when the parts to be burnished are delicate or subject to deformation. A case in point is the ordinary thimble which some manufacturers have thought could not be polished in a barrel. After considerable study a large Connecticut manufacturer has successfully designed a barrel burnishing operation for nearly all types of thimbles.

The use of a finishing barrel is essentially a low cost operation and today, when the character of finish of a metal product bears so close a relation to sales volume, it is strange that the barrel is not more generally adopted, not as a substitute for anything else, but in its own right as an added piece of finishing equipment.

Travel to some of the varied shops of barrel users and you can compile a long list of cases where the introduction of a burnishing process has meant added sales. A New England stampings manufacturer tells how he saved a large account with an automobile company in competition with a much nearer source of supply by putting parts through a barrel finish at low cost. The manager of a forging shop said: "Yes, we use the barrels for most everything. Parts in the stock room get to looking pretty seedy after a few weeks so when we get an order we dump the stuff in a barrel before shipping. Maybe it doesn't do much good, but it makes it look better, and we figure the customer likes that."

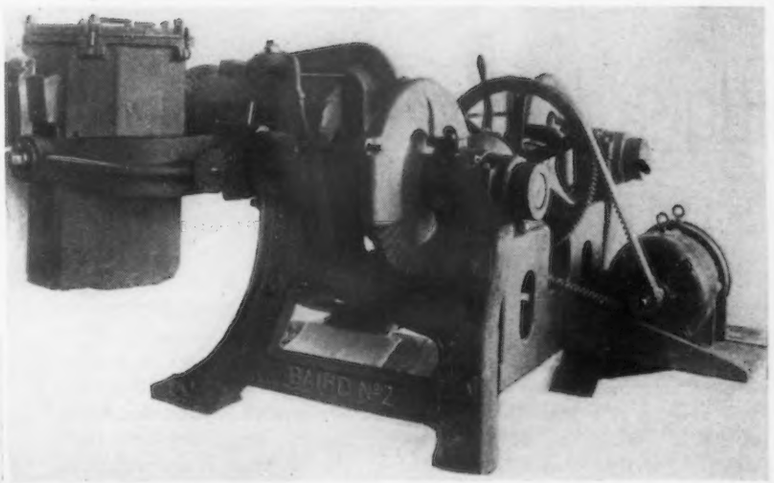
The economy of barrel finishing is illustrated by the recent experience of a safety razor company. A new type of handle had been developed, having spiral grooves cut on a milling machine. At first these were polished, but the edges tore the buffs and aside from that the finish was poor in the bottoms and corners of the grooves. Tumbling was scarcely considered because it was felt that if even small shot were used in the barrels the corners of the grooves would never be reached. A tumbling expert studied the problem, designed a special shape which would reach the corners, and now a better finish is secured in a tumbling barrel than was secured formerly by buffing, and at about one-tenth the cost.

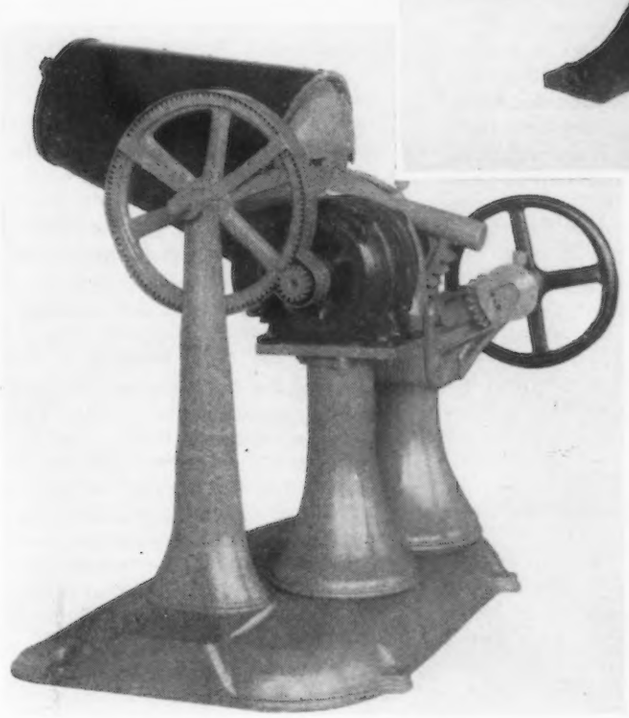
In the above case the job was not well suited to wheel buffing. Probably a buffing engineer would have redesigned the handle itself so that without losing artistic



merit it could be efficiently finished on a buffing wheel.

The problem, of course, is seldom as simple as merely substituting one process for another. In some cases the manufacturer would get better results at a lower cost by reversing the razor handle experience, if his product were adapted to rapid finishing by polishing or buffing.





ABOVE

WITH this variable action machine it is possible to revolve the barrels in nearly any position

Courtesy The Baird Machine Co.

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AT LEFT

THIS is a rugged type of tilting barrel featuring ease of control and work shifting bottom

Courtesy Globe Machine & Stamping Co.

The point for the plant manager to appreciate is that the finishing process must always be suited to the product. And if it is the final finish as far as his plant is concerned, even though his customers may do further fabricating, appearance as well as process must be suited to the product.

A manufacturer of building hardware formerly finished brass escutcheon plates by a hand sand blast process. Seeking lower cost he tried barrels but without success. Then he called in an engineer to see what the trouble was. The engineer merely changed two variables to solve the problem. He reduced the speed of the barrels from 36 to 18 r.p.m. and introduced Windsor Locks brass sand and water as the abrasive mixture. The escutcheon plates are now being successfully polished in tumbling barrels. The sequence through the process takes about 30 min. and consists of tumbling, washing, air drying, and finally of drying and polishing in a second barrel using hardwood sawdust.

Many Uses

The barrel is used for a great variety of processes associated with finishing. A saving in ma-

(CONTINUED ON PAGE 70)

AT LEFT

THESE sketches illustrate the need for special shapes to reach corners and angles impossible to polish with round balls

Courtesy The Baird Machine Co.

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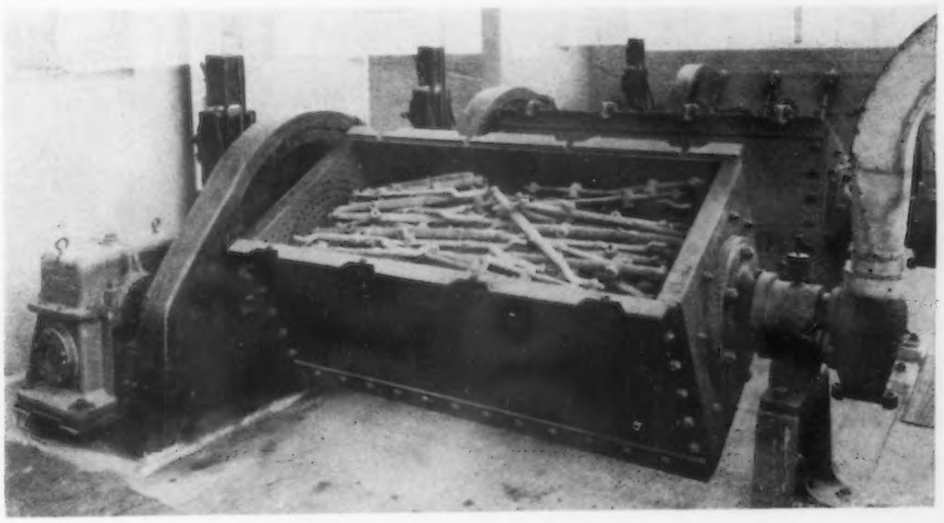
AT RIGHT

AT the plant of the Textile Machine Works there is a battery of eight of these 30-in. by 48-in. square Whiting tumblers for preparing castings and forgings for subsequent finishing

Courtesy Magnus Chemical Co.



Huge Keller Automatic Cuts Dies For

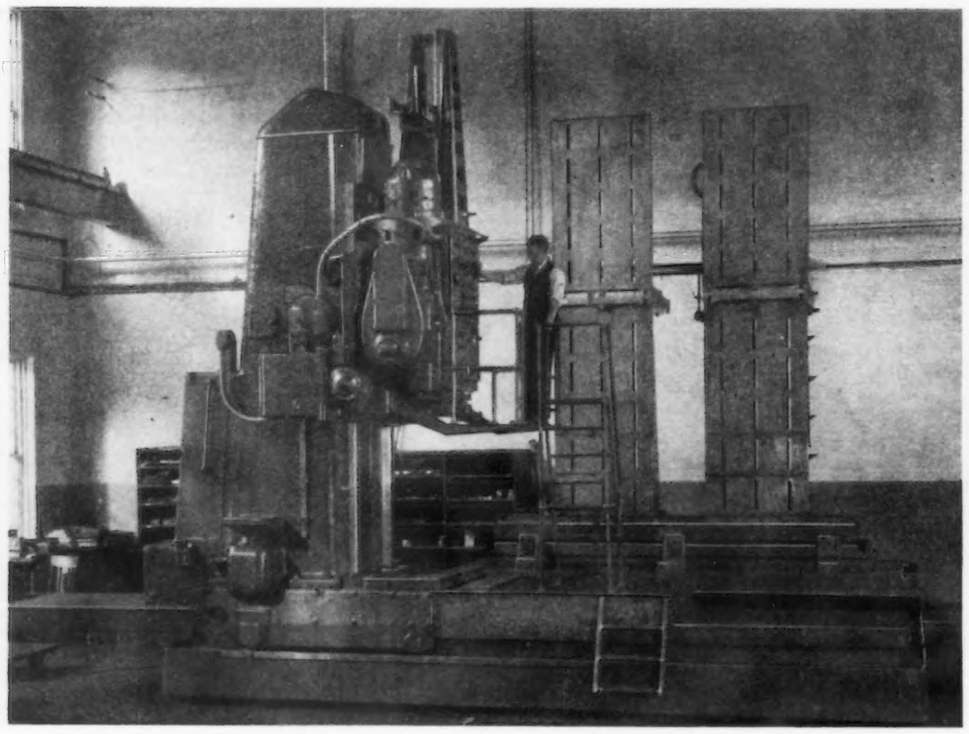
THE radical changes in automotive body design over the past year or more were reflected immediately in new manufacturing equipment. With the advent of streamline, airflow and other new designs there has been a tendency in the direction of larger and deeper stampings with greater accentuation of curves. The steel mills have been called upon to produce wider and wider sheets, and the past year has seen the installation of presses that are larger and more powerful than previous models. Furthermore, new equipment to facilitate production of heavy dies for the larger stampings has been made available.

The accompanying illustrations show a huge new Keller automatic tool room machine, the type BG-3, developed by the Keller division of the Pratt & Whitney Co., Hartford, Conn., for this class of work.

THE wider sheets and larger and more powerful presses demanded by recent developments in automobile body design have been described in previous issues. The present article deals with a further reflection of the advent of streamline, airflow and other new designs, namely with equipment behind the presses — die cutting machines. As in the presses, huge size is notable; also the new features of construction made necessary by the extremely heavy dies required.

As compared with the largest previous Keller automatic, the new machine weighs almost two and one-half times as much, its net weight with fixture being 154,000 lb. as against 64,000 lb. of the other model. In height, it is 21 ft. 1 in. overall; in length, 32 ft. 5 in.; and in depth, 19 ft. 3 in. It will cut an impression 12 ft. long by 6 ft. high by 30 in. deep, without resetting of the enormous die blocks for which it was designed.

In fundamentals, the machine is similar to the previous Keller BG types and to some floor-type boring machines. But before operation and design features are reviewed, the rapid meeting of the demand for a machine of this size might be commented upon. The first of two of these machines shipped to a prominent automotive company was ordered at the end of March of last year, after engineers of the automotive and Pratt & Whitney Companies had determined upon range, productivity and essential characteristics. By Oct. 15, or within 6½ months,



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CUTTING a die impression 12 ft. long by 6-ft. high by 30-in. deep is within the capacity of this new large Keller automatic tool room machine, which, with fixture, weighs 77 tons. The operator rides on a platform on the saddle as shown, the saddle in this view being elevated about two-thirds of the maximum. Trim appearance results from the elimination of a separate control cabinet, the simplification of exterior wiring, harmonious design of gear boxes and other units, and the interior counterweighting.

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New Large Auto Body Stampings

R. E. MILLER
Machinery Editor
The Iron Age

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every detail had been designed, all patterns made, and the first machine entirely finished and shipped. Shipment required five extra-large box cars. In the meantime the second machine was well on its way to completion. Within a few weeks after shipment, the first machine was operating in the automotive company's plant in producing large dies for stampings used in cars exhibited at the New York Automobile Show, Jan. 5-12.

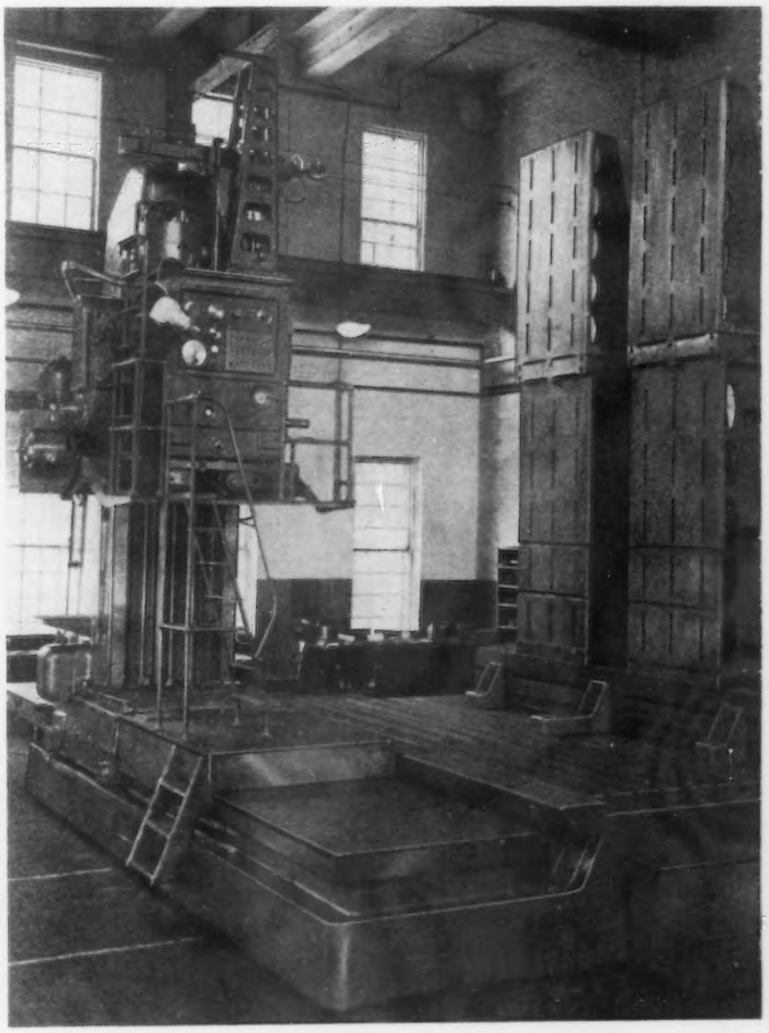
Previous Principles Followed

As in previous Keller machines the work and model, or master, are bolted to a fixture placed vertically on a stationary table. The column moves horizontally on the bed, the saddle travels vertically, and the entire head of the machine moves transversely on the saddle. In addition, spindle adjustment of 9 in. is provided.

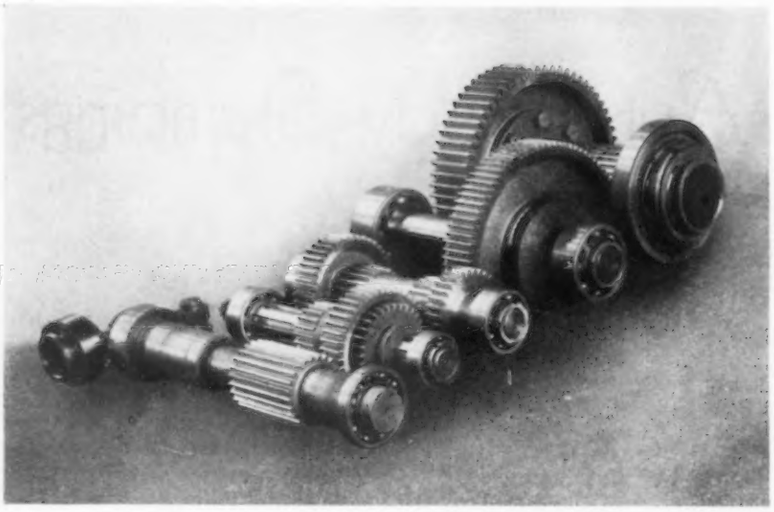
Like all Keller automatics, the primary function of the machine is the reproduction of a die from a model. An electric tracer is mounted on a bracket above the milling cutter and the distance between the two is adjusted for the job to be done. From then on the tracer and cutter move in unison. The tracer controls magnetic clutches which drive the various motions of the machine, and this control permits the tracer to maintain continuous contact with the model.

In three-dimensional work, such as automotive body dies and punches, the machine is set to operate automatically, requiring no guidance by the operator. The tracer covers the entire surface of the master in a series of parallel strokes, either up or down or right and left. The length of these strokes is determined by adjustable reversing dogs, although it is controllable also by hand through a reversing switch. At the end of each stroke an automatic feed takes place before the next stroke begins. The amount of feed at the end of each stroke also may be determined in advance by a feed mechanism, or regulated by hand-operated push button.

The tracer itself controls the third dimension. The arrangement is such that when the tracer point is not in contact with the master the machine is caused to travel in. The instant contact is established, varying degrees of pressure on the tracer point (created by contours of the master over which it passes) cause the machine to travel in and out accordingly. The tracer also responds to either axial or side pressure, and, if necessary, eliminates the horizontal or ver-



AMONG other major units, this view of the new large Keller automatic shows the angle plate fixtures. The two uprights are supported on a bolster plate. They are adjustable toward and away from each other and the upper angle plate on each upright is also adjustable forward and backward. The design is such that the heaviest dies and models are supported rigidly. Steps and hand rails are provided at the sides of the uprights as shown.



ABOVE

SPINDLE drive gear train set for highest speed. The gears are of chrome-vanadium steel, and are hardened and ground and full ball-bearing mounted. Spline shafts are used instead of keys. The largest gear of this train has a pitch diameter of 16 5/16 in.

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tical motion while traveling either in or out.

Consequently, the complete form of the master, or model, is reproduced no matter how steep the sides of its cavities or elevations may be. This is accomplished in response to a pressure of only a few ounces, whereas the pressure on the cutting tool, obtained through a positive leadscrew drive, is sufficient to remove metal up to the limit of strength of the milling cutter employed. Because of the light pressure on the tracer point, the model may be of a comparatively soft material, a wooden model being customarily used for the punch and an artificial stone or composition model, which has been cast against the wooden punch model, for the production of the die.

The machine is also capable of automatic profiling. The tracer is of a different type; it controls and guides only the vertical and horizontal movements of the machine, the cutter having been set to a given depth before the operation is started. Ordinarily a thin sheet metal template is used as a master. This operation is useful in the production of blanking punches and dies, cams, templates, gages and drawings.

Although incorporating the essential principles of previous designs, the new type BG-3 Keller automatic toolroom machine goes far beyond its predecessors in many details. It not only has wider range, with increased power and rigidity, but incorporates new

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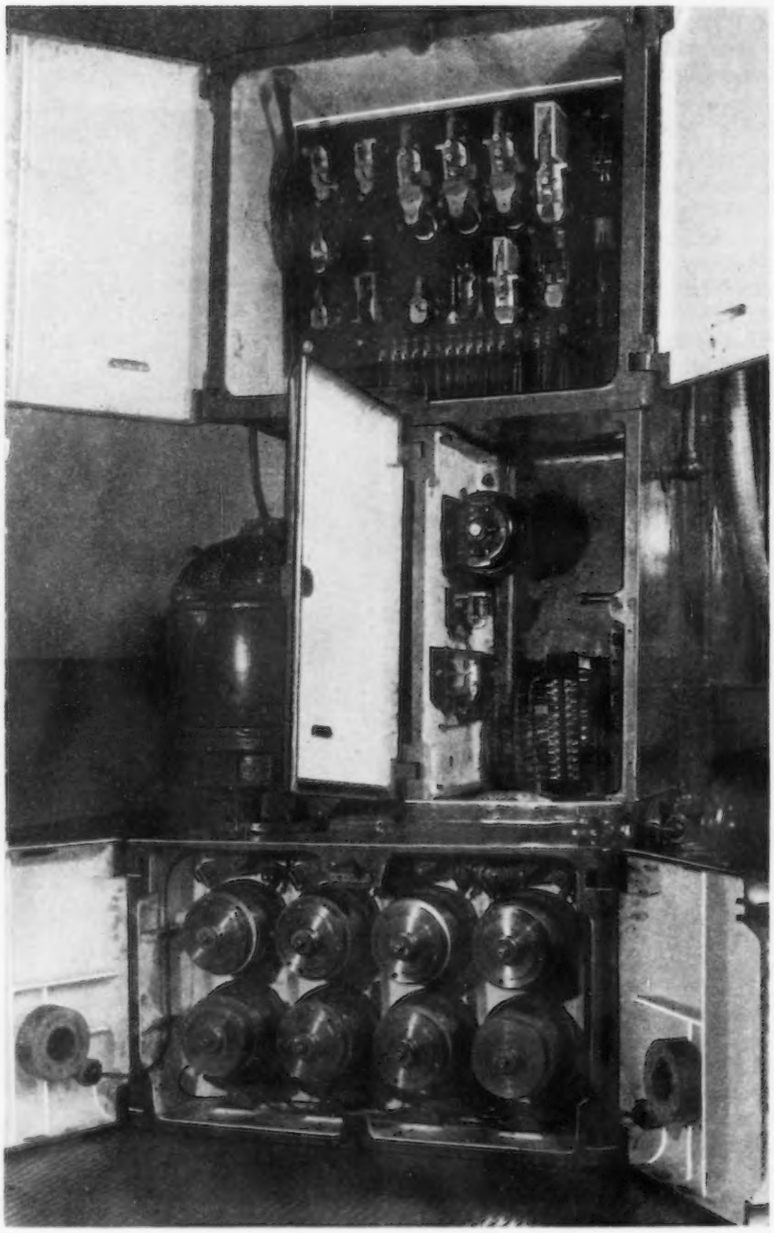
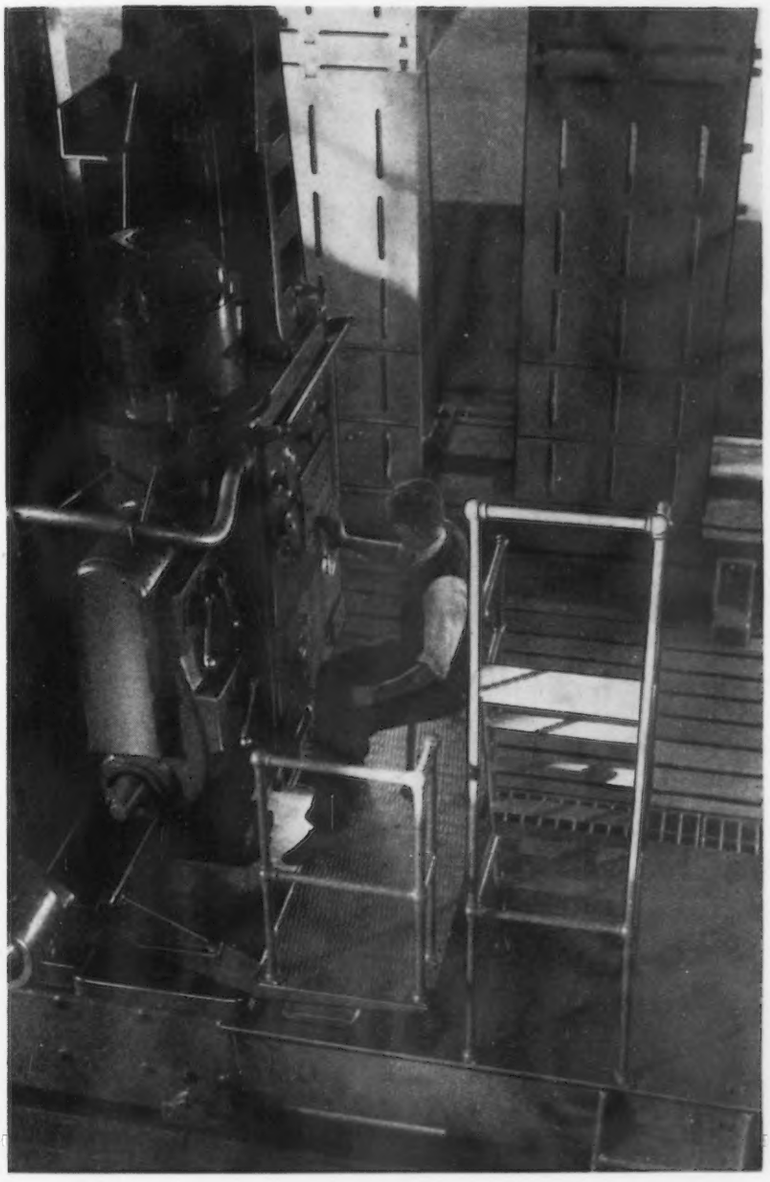
BELOW

THE vertical and horizontal magnetic gear drive boxes are shown at the bottom of this detail view. The upper four magnetic clutches provide speed selection and the lower four select the direction of travel,—up and down, right or left. Magnetic brakes are attached to the doors. By means of this magnetic gear box and its control, the latter located on the head of the machine, any rate of travel up to a rapid traverse of 100 in. per min. may be immediately engaged or disengaged. The motor starters are shown in the uppermost open box.





CLOSE-UP view of operator's platform. The operator can see the work easily at all times and need not leave the platform while the machine is in operation. The three knobs on the upper side of the panel control the complete range of spindle-motor speeds and of horizontal vertical and transverse feed and rapid traverse. Shift levers connected with the spindle-drive gear box are also within easy reach.

features of construction and operation.

The spindle is driven as directly as possible by a 10 hp. adjustable speed motor mounted vertically on the gear box. This motor has no other function than to drive the spindle, for which purpose it has ample power. Gears are hardened and ground. They are carried on ball bearings and lubricated constantly by means of a pump inclosed in the gear box. Spindle-speed changes are accomplished by means of three levers and without pick-off gears. The speed range is from 10 to 800 r.p.m. in infinite steps, which provides for the wide variety of cutting conditions that a machine of this type will encounter.

Two interchangeable spline-driven spindles are provided with the machine. They are identical except for length. The longer one has a maximum extension of 34 in. from the head, and the shorter a maximum extension of 10 in., so that full use may be made of the transverse travel of the machine in the production of dies of different depths. The spindles are 5¾ in. in diameter and are carried in 10-in. sleeves. They are mounted on double roller bearings in the front end, while the rear end floats on a cylindrical roller bearing. They are bored for a No. 16 B & S taper and are also provided with drive keys for face mills.

Although the electrical control features have been multiplied and extended, the wiring of this machine has been simplified. Earlier type BG machines had five groups of electric control mechanism, each of which had to be flexibly interconnected with the others. In the

(CONTINUED ON PAGE 84)

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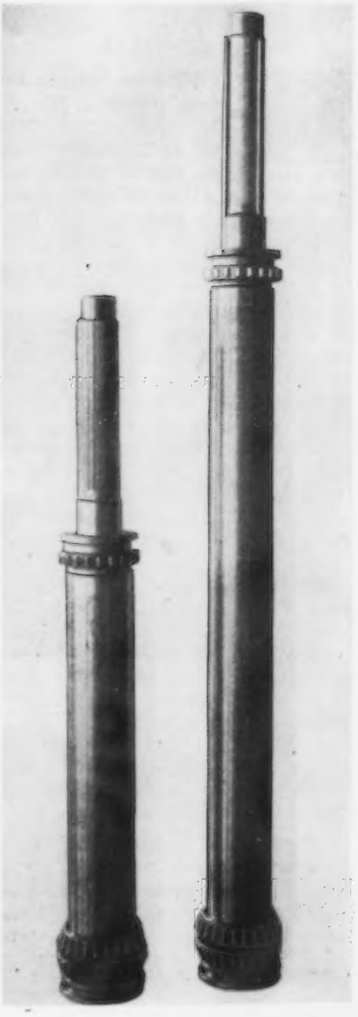
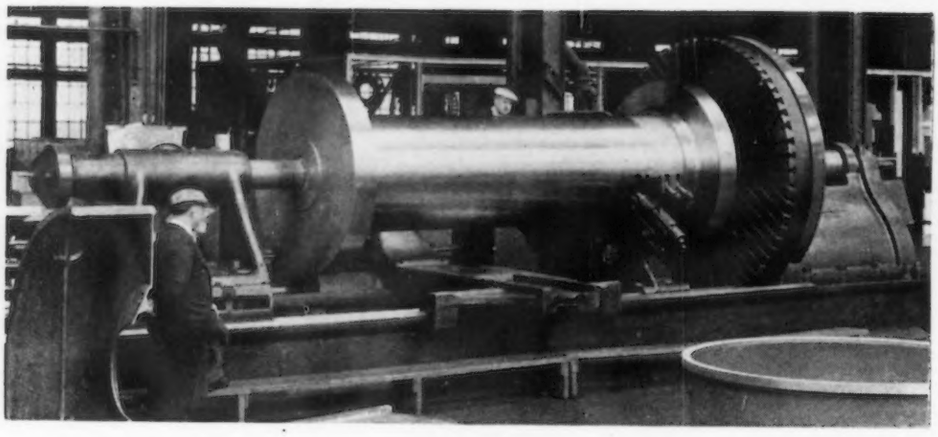
BELOW

ONE spindle supplied with the machine is 84 in. long and the other one is 60 in. long. Both are 5¾ in. in diameter. Their tails carry splines by means of which they are driven from the drive gear box.





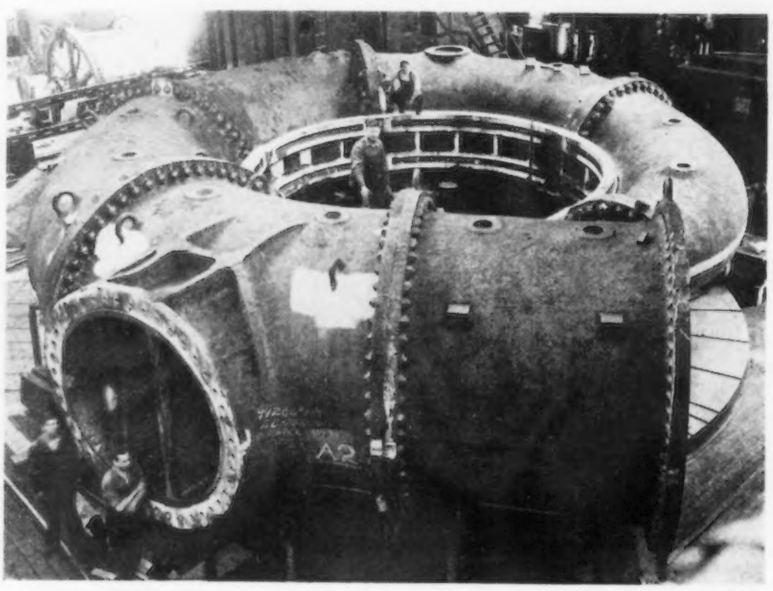
A SECTION of the main shaft for one of the 115,000 hp. hydraulic turbines being given finishing touches in the machine shop. Each main shaft is 38 in. in diameter.

A Preview of World's Largest Hydraulic Turbines

THE four largest and most powerful hydraulic turbines ever built, all for Boulder Dam, are now in the course of construction in the Allis-Chalmers Manufacturing Co.'s erecting shop. Each of these turbines is capable of developing 150,000 hp. when the water in the reservoir reaches a maximum head of 592 ft. Each turbine can handle 270,000,000 gal. of water daily, three times the average daily water consumption of the city of Milwaukee. The casing of each is 10 ft. in diameter at the intake and is built in six sections to permit railroad transportation. Each casing weighs about one-half million pounds. A total of 60 railway cars will be required to ship the four units. The turbine runners are made of cast steel, in one piece, and each runner has a nominal diameter of 166 in. The shaft is 38 in. in diameter. An efficiency of 89 per cent has been guaranteed. With each turbine is a pressure regulator, the largest ever built, to prevent surges when a load is suddenly thrown off. At 490 ft. head these turbines are rated at 115,000 hp.

These four turbines will drive generators supplying power to the City of Los Angeles over a transmission line 270 mi. long. Later on additional units up to a total of 15 will be installed, some of which will supply current to drive pumps for the huge Colorado River aqueduct which is now in course of construction and which is to carry water from Parker Dam, located on the Colorado River 165 mi. below Boulder Dam. This aqueduct will take water from Parker Dam and carry it for a distance of 241 mi. to the Jahalco Reservoir, near Pasadena, Cal.

Cost of the Boulder Dam development is $170,000,000, exclusive of the Colorado River aqueduct which is costing $220,000,000. The transmission line requires an outlay of approximately $25,000,000.



MACHINING one of the spiral casings on a 40 ft. boring mill. The casing inlet, shown at the left, is 10 ft. in diameter. Each casing weighs 500,000 lb. and is constructed in six sections for transport on railway cars.

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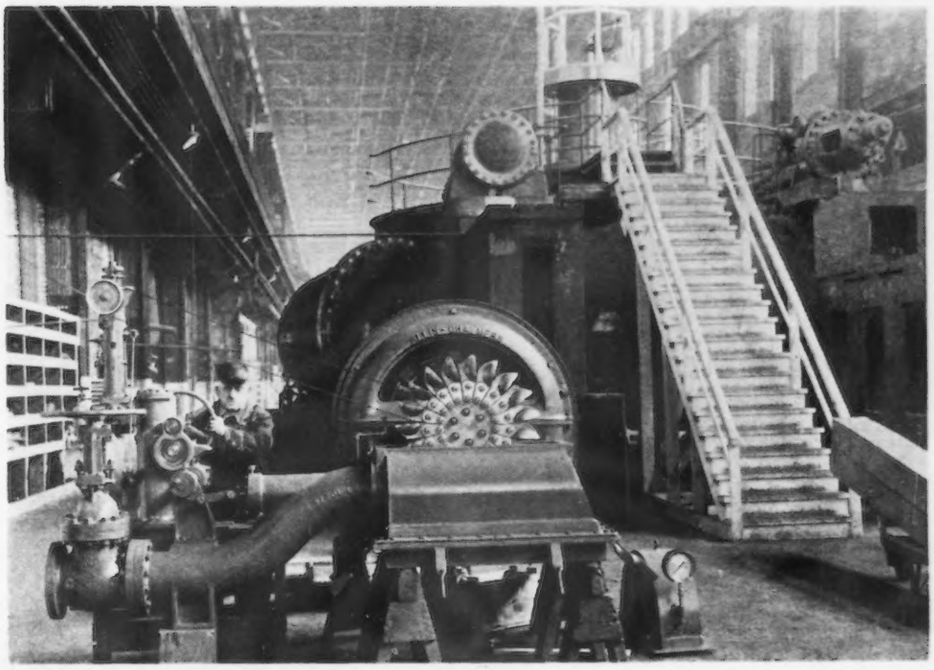
AT RIGHT

HERE is a contrast between a 115,000 hp. Boulder Dam turbine and a 460 hp. hydro-electric unit which is sectionalized so that it can be transported by airplane to a mining camp in Mexico.



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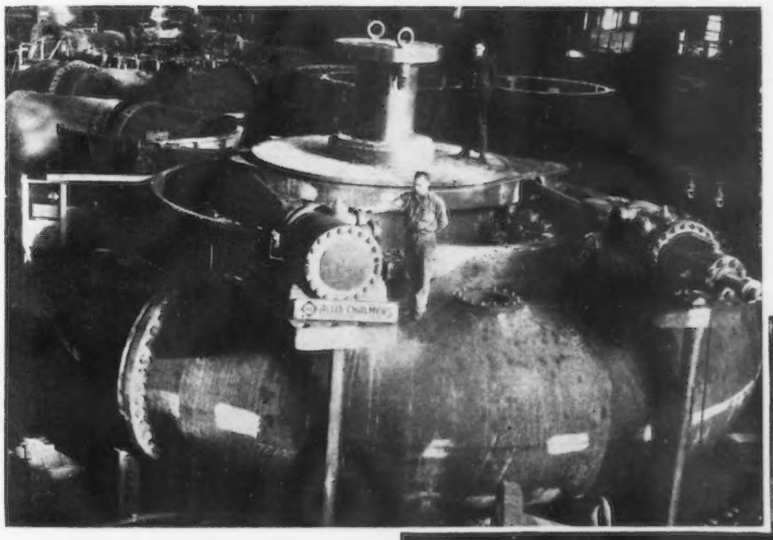
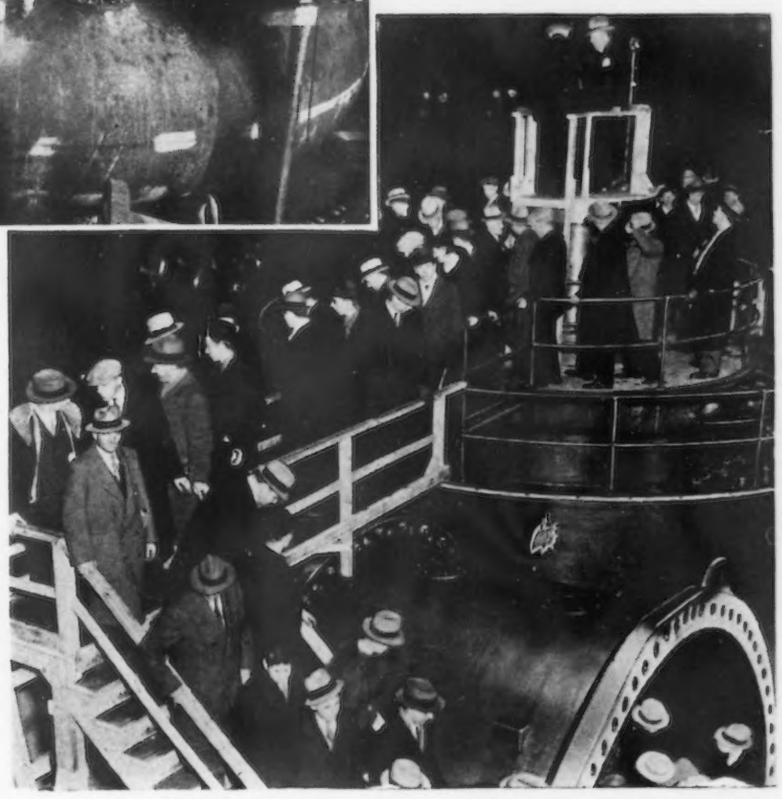


BELOW

THE Boulder Dam turbines and other equipment being manufactured by the Allis-Chalmers Manufacturing Co. attracted 30,000 visitors to an open house recently held by the company.



ABOVE

N the foreground is one of the turbines in the erecting shop. A total of 60 railway cars will be required to ship the four turbines from Milwaukee to the site of Boulder Dam.

Improvements in Production

Hydraulic Internal Grinders Employ Bridge-Type Bed Construction

TWO 15-in. sizes of hydraulic internal grinders are being built by the Landis Tool Co., Waynesboro, Pa. Illustrations are given below. The insert shows the sizing device and the hydraulically reciprocated grinding wheel fixture.

The 15 by 8-in. machine is designed for the smaller bores and is equipped with the Landis-Solex sizing device and a hydraulically recriprocated grinding wheel fixture. This equipment may be omitted when rapid production is not to be performed. The 15 by 11-in. machine is equipped with these features only on special order.

The sizing device functions during the entire grinding cycle directly from the work diameter. It may be used for any straight or tapered hole. It will size splined, key-wayed or interrupted holes. Its operation is based upon the sensitiveness of change in air pressure which sensitiveness controls machine movements by means of mercury-type electric switch and solenoids. The grinding wheel fixture is hydraulically reciprocated when grinding bores 2¾ in. in depth or less. Bores having a depth greater than 2¾ in. are ground by hydraulically reciprocating the work table.

Through use of the grinding wheel quill spring-compensating device, the cross feed automatically compensates for any spring in the quill. Bores having steep tapers up to 90 deg. can be handled on the standard machine.

Sturdily supported Excello ball bearing spindle is employed.

The grinding wheel feed may be either manual or automatic, through the medium of a large feed screw and nut. Wheel base hydraulic back-lash is featured and the bed is of rigidly webbed, box type construction. A water reservoir is located at the rear and an oil reservoir located in the base.

Three electric motors are used. The work-drive motor ¾ hp. constant speed on the 15 by 8-in. size and 1 hp. on the 15 by 11-in. machine. Both machines have 1½ hp. constant speed pump-drive motor. Either a 3-hp. or 5-hp. constant speed wheel drive motor is used on the smaller machine while the larger machine requires a 5-hp. constant speed motor.

Net weight of the 15 by 8-in. machine is 5500 lb., the 15 by 11-in. machine weighs 5800 lb., each exclusive of electrical equipment.

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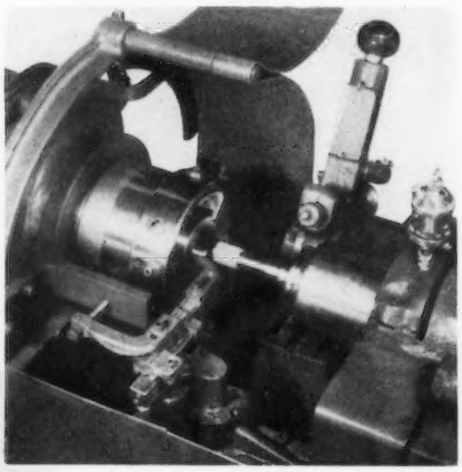
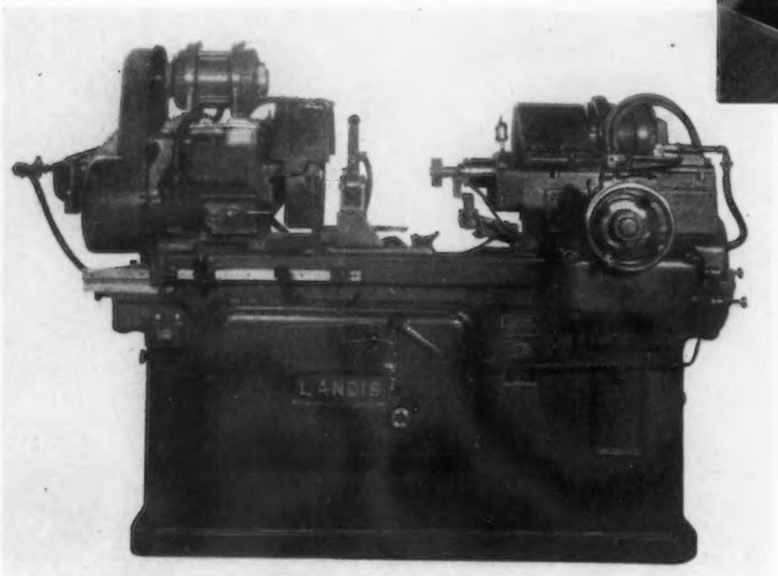


BRIDGE-TYPE bed construction is employed. The sizing device (insert) functions during the entire grinding cycle, directly from the work diameter or it may be left out of the set-up when rapid production work is not to be performed.



and Shop Equipment . . .

Broaching Machine Design Covers Simple Work-Changeover

SINGLE slide broaching machines are an addition to the broaching equipment line manufactured by the Foote-Burt Co., Cleveland. The machine, shown below, is simple in change-over as only fixture and broach holder change is required; often on plain flat surfaces, the broach can be designed to handle several different jobs and need not be changed. The cutting stroke is adjustable by dog on the broach slide.

The column carrying the broach slide and table, and the base are well ribbed and tied together.

Interchangeability is a design feature and high production can be obtained on small parts with limited surface area by stacking two or three pieces in a fixture and using one broach, or by placing pieces side by side and using two or three broaches side by side in the broach holder. As an example of production, on a machine which might have a down cutting stroke of eight sec., and an up stroke, or return of four sec., the total time per piece would be 12 sec., and would give a production of 300 strokes per hr., or 300 pieces. During the up stroke one piece would be loaded and by using that time to load two pieces, a production of 600 pieces per hr. would be obtained.

In operation, work is placed in a holding fixture on the machine table and the operator throws a lever at the front right side of machine which pushes the table into cutting position. As the table reaches position a valve is automatically opened starting the broach slide down, and as soon as the broach has passed its work, the table is automatically returned to its loading position by cam movement; the broach slide then returns to its starting position and remains there until the starting lever is again pushed forward. The reciprocating movement of the broach slide is accomplished by hydraulic pump, driven by a constant speed motor through V-belts.

The broach slide to which the broach holder is bolted is of massive construction with heavy sections and long bearing surfaces. The slide moves up and down on long, wide, square ways supported throughout its entire travel. Hydraulic plunger is fastened directly to the lower end of the slide.

The broach is heavy back type construction and unusually long. Because of the number of teeth on the broach, an individual tooth is never burdened and dulled with heavy cuts; the lower teeth are roughers; the upper teeth do the final finishing and are never used for roughing. For sharpening, the

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UNDER certain conditions of work changeover only the fixture needs be changed; under other conditions change of both fixture and broach is made. Simplicity is said to mark the design.

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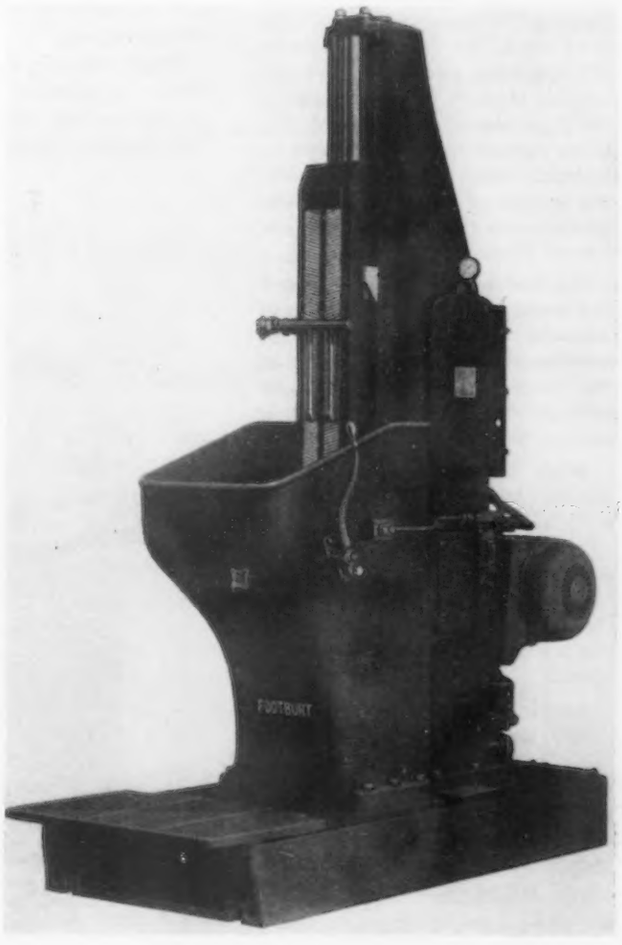


broach is removed by withdrawal of socket head cap screws.

Broaches are usually designed for each individual job and are made up in sections and marked. Slow cutting speeds averaging about 30 ft. per min. and solid support of the broach are low expense factors, and it is claimed that the broach may often be run continually for several days to a single grind. All adjustments on the broach are made in the broach holder. The holder is keyed in place on the slide and in changing from one job to another, it is only necessary to bolt the holder in position.

The machine base forms a large coolant tank and the front platform may be tilted up for the removal of chips. The chip compartment is in the center of the base below the broach. The coolant passes forward to the front of the base and then through two side channels back to the pump compartment; baffle plates arrest all chips.

The column houses the cylinder, hydraulic pump, valves and all piping. The cylinder is mounted between the ways and the cylinder head forms the top of the column. All hydraulic parts are easily accessible through large openings in the right side of the machine. The lower part of the column forms the hydraulic tank and holds a generous supply of oil with two cocks provided for checking the high and low oil levels.

The hydraulic pump is of standard make. The control valve is of company design and operates by knob handle at the right front of the machine, to start, stop, or reverse the broach slide. It is used principally for setting up.

Work holding fixtures of individual job design are mounted on a sliding table which moves to and from the broach on hardened steel ways supported by the work table base. Quick loading is featured and the unloading and loading is done on the up stroke of the broach.

An indexing work table of rotary type can be supplied; this table is hand operated and requires an extra work fixture. It provides additional loading time as work can be loaded both on the up and down strokes of the broach.

The lubricating pump runs in oil; pump drive shaft bearings and broach slide are automatically lubricated from hydraulic system.

Coolant is delivered to the work and broaches by centrifugal vane-type pump in the coolant tank and driven by an individual motor.

The machine is built in two sizes, No. 22 having a capacity of 5 tons and driven by a 10-hp. motor; No. 23 with 10-ton capacity and driven by a 20-hp. motor.

Forging Rolls with New Die Adjustment

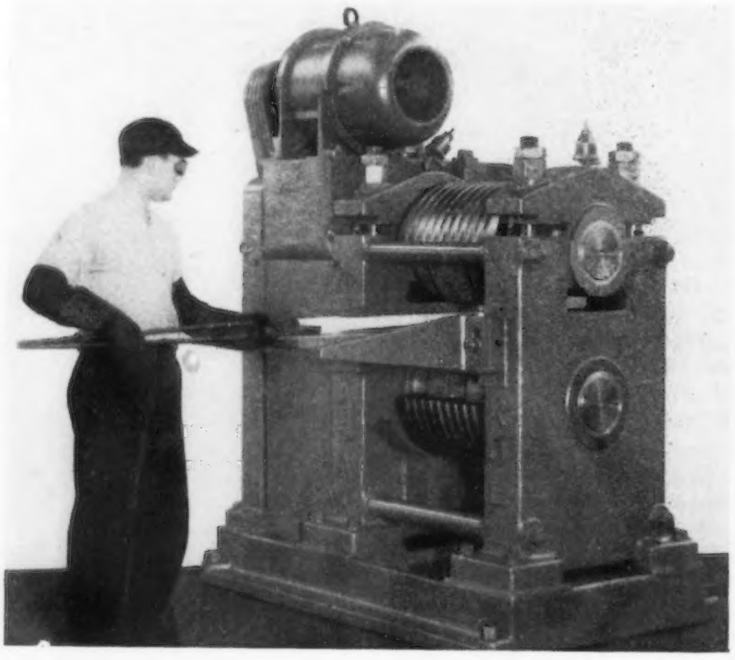
"WIDE Adjustment" forging rolls replacing earlier models, are announced by the Ajax Mfg. Co., Cleveland.

Rolls of the "0," or smallest size, are used in automotive work for tapering the ends of spring leaves and pointing coil springs. The Nos. 1 and 2 sizes are used for forging gear shift levers, rear axle drive shafts, and similar pieces, and for fullering and drawing operations on stock prior to drop or upset forging.

These rolls are characterized by "wide adjustment" between the semi-cylindrical dies in which the forging impressions are sunk, permitting a greater number of die redressings and resulting in corresponding expense reduction. The adjustment is accomplished through a gearing arrangement wherein the meshing of the roll gears is not disturbed by the 2¼ to 4 in. adjustment provided. The new arrangement contrasts with previous ⅜ to ¾ in. adjustment, where long-toothed roll pinions were moved into and out of proper mesh resulting in joggy operation and excessive back lash. There is also a lead adjustment on the top roll die to bring intricate or shouldered impressions easily into perfect match.

The top roll housings are adjustable vertically for proper forging thickness, and are, like the main housings, of steel casting with great cross-sectional area for rigidity. These housings have provisions for taking up end play on the roll shafts, thereby preventing transverse mismatching of dies. The roll shafts have integral die holders in which the die screws are so located as to make possible the use of half width dies.

The gearing is housed and guarded against foreign matter, and is of steel with machine cut teeth throughout. Plain bearings on all shafts are alemite grease-lubricated. Bearings for the roll shafts are fitted with constant-



NEW adjustment is provided between semi-cylindrical dies in which forging impressions are sunk.

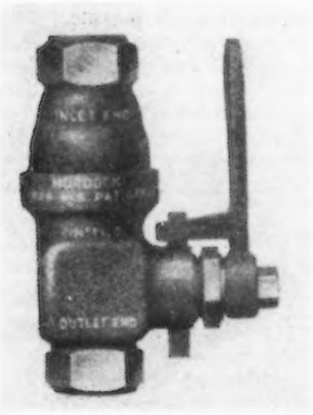
feed pressure cups providing continuous lubrication.

Drive is from individual motor, mounted on an adjustable hinged bracket above the gearing, through multiple V-belts to the flywheel. The flywheel of the continuous-operating machines has a friction-slip in the hub which acts as a safety in case of misplaced stock.

The larger sizes can be equipped for stop-motion operation with the Ajax air clutch and co-acting brake, as employer on other Ajax equipment. This places the operation of the rolls entirely under the control of the operator, making it possible to use dies with intricate impressions as well as considerably widening the variety of pieces that can be roll forged.

New Air Valves Have Renewable Seat Design

THE employment of both an upper and lower valve stem travel guide, with heavy spring pressure constantly tending to hold the valve seat in closed position from which it can be raised only



by circular cam motion imparted through lever having support on both sides of the vertical lifting centerline, is announced as featuring a line of air valves introduced by the Murdock Mfg. & Supply Co., Cincinnati. Disk-seating features the elimination of seat grinding through the use of a renewable disk member.

The spring and cam design provides that the valve shall be in either closed or open position at all times.

Improved Rotary Pumps in Wide Size Range

ROTARY pumps of an improved design are now being built by George D. Roper Corpn., Rockford, Ill. These are offered in 14 sizes for pressures up to 100 lb. per sq. in. and in capacities up to 500 g.p.m. Bearings are of the high lead bronze sleeve and large journal type; constant lubrication is supplied by the flow of liquid being pumped.

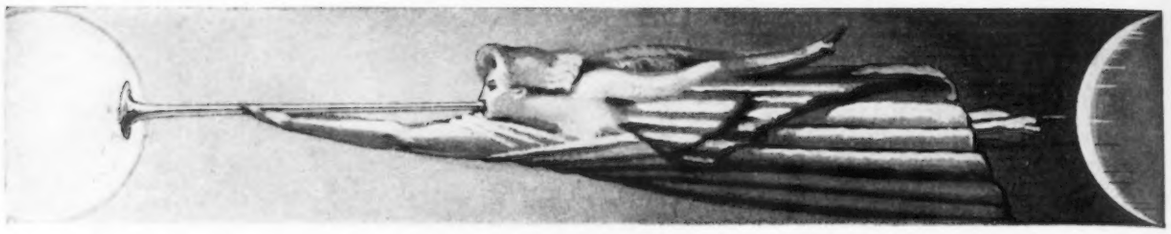
The pump head is composed of two heat-treated steel herringbone gears which are forged integral with the shafts and operate in a cast iron case. Mounting can be on bed plate with space provided either for standard motors or for special motors. If desired, the pumps can be furnished bronze fitted or all bronze when liquids injurious to iron are to be handled.

Light Weight Features Hand Truck and Skid

YALE zephyr hand-lift truck and a featherweight skid-platform, illustrated below, are announced by the Yale & Towne Mfg. Co., Philadelphia Division.

This equipment is designed for rapid handling of loads up to 1000 lb. To elevate the load, the operator grasps the handle, depresses the treadle and leans back; through leverage action, his weight lifts the load. In lowering the load, the procedure is reversed with the operator's weight acting as a counterweight.

The load can be transported with the handle in vertical or normal pulling position. The 36-in. x 42-in. featherweight skid platform which weighs less than 40 lb., can be handled in a 4-ft. aisle. The skid legs are welded to the deck.



NEWS OF THE WEEK

Potential Machinery Demand Is Huge

"THE potential demand for new machinery, accumulated during the five depression years, has grown to such large proportions as to indicate that virtually every unemployed worker in the durable goods industries could be given a full-time job for two years to come, if the demand were to be translated into actual orders," Frederick V. Geier, president of the Cincinnati Milling Machine Co., said last week in Cincinnati.

"This means that the unemployment situation in industrial centers throughout the country would vanish almost overnight if manufacturers should place orders for essential machinery and equipment required to replace that rendered obsolescent or outdated since 1929. It means, as well, that there would be a wholesale revival in all business done, including retail trade of every description."

Mr. Geier based his estimate on a survey of the pent-up machinery and equipment requirements of the country, which have been held back during the depression. The survey, made by the Machinery and Allied Products Institute, Chicago, discloses that the potential demand for new machinery and equipment throughout the United States at the present time totals $18,574,000,000.

"That," said Mr. Geier, "represents about three-fourths of what it would cost to reproduce all the Class 1 railroads of the United States. It is almost as much as is collected in taxes by all forms of Government in this country for two years. On the average 65 per cent of the cost of all machinery is paid out in the form of wages to labor that produces it and the raw material from which it is made. On that basis, there is in prospect a potential payroll of more than $12,000,000,000 to labor to be employed in making this vast amount of machinery when the log jam is broken and manufacturers replenish their badly run down plants. It would mean work for 4,000,000 men for two years."

The survey covered the potential machinery and equipment needs of approximately 150,000 industrial plants in the United States. It discloses that from one-fourth to one-half of the nation's industrial plants have become obsolete during the depression and will have to obtain new machinery and equipment when industry revives if they are to hold their own in the increasing competition for business.

"One of the most significant revelations in the survey," said Mr. Geier, "is the showing made by machine tools. The largest single classification, or 68 per cent of all the requirements among machinery manufacturers themselves, was machine tools. That item comes first in the volume on the listing of five classifications of machinery and equipment needed by the machinery industry itself."

It was incorrectly stated in THE IRON AGE last week that the definition of a jobber of tubular goods, as contained in Regulations No. 7 of the steel code, had been extended to include the United States Government and State and municipal governments and departments thereof. The revision in the regulations only added the United States Government and States and municipal governments and their departments to the list of manufacturing consumers of steel to whom a jobber may sell 75 per cent of his tonnage, in order to be classified as such.

Johnson Cites War Value of Scrap

OUR wealth in scrap materials is one of our best guarantees against attack by a foreign nation, Gen. Hugh S. Johnson told the National Association of Waste Material Dealers in an address in Chicago last week. He went on to point out that both Italy and Japan are barred from undertaking a long drawn out war because of their poverty in materials and particularly in iron and steel.

"Do you know," he said, "that of our massive production of 25,000,000 tons of steel, not less than 16,000,000 tons come from melted scrap? Why, to my mind, that figure is a stupendous thing and especially so in the danger that now threatens the whole world."

Reinforcing Steel Group to Meet

THE eleventh annual meeting of the Concrete Reinforcing Steel Institute and of the RMFI code will begin on Monday, April 29, at the Homestead Hotel, Hot Springs, Va., and continue through Wednesday morning, May 1. The purposes of this meeting are to review in detail the current situation under the code of fair competition for the reinforcing materials fabricating industry and to make plans for future developments under proposed legislative procedure which will be before Congress shortly.

The directors of the Illinois Manufacturers Association have adopted a resolution opposing the extension of the National Industrial Recovery Act in any form.

British Steel Import Duties Raised To 50 Per Cent—Demand Holding

LONDON, March 25.—(*By Cable*).—The Treasury has increased duties on foreign imports of semi-finished steel, excluding wire rods, steel bars, angles, joists, hoops and strips and rails in amounts ranging up to and exceeding 50 per cent of c.i.f. value.

British steel makers are optimistic, and further business expansion is expected. Rerollers, however, are fearful for the future of export trade.

Pig iron is quiet, but releases are freer and second quarter orders are now anticipated. Hematite exports are light because of unsatisfactory prices and Dutch and Belgian competition, but home sales are expanding.

Because of the duty increase, transactions in foreign semi-finished steel have been completely suspended, and domestic works are busy. Substantial orders for rails and structural steel have been received. Exports are steady.

Domestic tin plate demand is substantial owing to fears of higher prices in view of increased import duties on tin plate bars. Exports are light.

The Continental iron and steel market is unsettled by the political outlook, the uncertainty of international cartels and the English duties increase.

Overseas business is slightly better, particularly in the Near East, Manchukuo, South America and Scandinavia. South Africa has placed an order for steel sleepers, mainly with France, valued at £3,000,000. The export conversion rate has been reduced from 1.775 to 1.75.

British Prices, f.o.b. United Kingdom Ports

Per Gross Ton

Ferromanganese, export	£9
Billets, open-hearth	£5 10s. to £5 15s.
Tin plate, per base box	*18s. 2d. to 19s.
Steel bars, open-hearth	£7 17½s.
Beams, open-hearth	£7 7½s.
Channels, open-hearth	£7 12½s.
Angles, open-hearth	£7 7½s.
Black sheets, No. 24 gage	£9 5s.
Galvanized sheets, No. 24 gage	£11 5s.

*To June 1: 18s. 5d. to 19s. 3d. thereafter.

Official Continental Prices, f.o.b. Continental Ports

Per Metric Ton, Gold £

Current dollar equivalent is ascertained by multiplying gold pound price by 124.14 to obtain franc equivalent and then converting at present rate of dollar-franc exchange.

Billets, Thomas.	£2 7s.
Wire rods, No. 5 B.W.G.	£4 10s.
Steel bars, merchant	£3 5s.
Sheet bars	£2 8s.
Plate, ¼ in. and up	£4
Plate, 3/16 in. and 5 mm.	£4 2s. 6d.
Sheets, ⅛ in.	£4 7s. 6d.
Beams, Thomas.	£3 2s. 6d.
Angles (Basic).	£3 2s. 6d.
Hoops and strip base	£4 2s. 6d.
Wire, plain, No. 8	£5 7s. 6d.
Wire nails	£5 15s.
Wire, barbed, 4-pt. No. 10 B.W.G.	£8 15s.

Shafting Standard Revision Approved

APPROVAL of the American standard for shafting and stock keys has been announced by the American Standards Association, 29 West Thirty-ninth Street, New York. This standard, designated as the B17.1-1934, is a combination of four previously approved American standards, with changes and additions as follows:

Table 1, Finished Steel Shafting, is a revision of tentative standard B17a-1924, cold finished shafting. The series of transmission shafting sizes has been extended by the sizes 6½, 7, 7½, and 8 in., and the series of machinery shafting sizes, by the addition of the sizes 6¼ to 8 in. inclusive, stepping up by ¼ in.

Table 2, Plain Parallel Stock Keys, corresponds to tentative standard B17b-1925. Square and flat stock keys, in which the side of the square key and the width of the flat key for the shaft diameters 1 5/16 and 1⅜ in. have been changed from ⅜ in. to 5/16 in. A series of eight large keys, ranging from 1¾ by 1¼ to 6 by 4 in., has been added in Table 3. These keys are not given in relation to any specific shaft diameters.

Tables 4 and 5 relate to plain taper stock keys and are the revised American tentative standard B17d-1927. A revision was made in that the range of shaft diameters from 1 5/16 to 1¾ in. inclusive, originally covered by one square key (⅜ by ⅜ in.) and one flat key (⅜ by ¼ in.), was divided into two ranges. 1 5/16 to 1⅜ in. inclusive, and 1 7/16 to 1¾ in. inclusive, the side of the square key, and the width of the flat key being reduced to 5/16 in., for the smallest of these two ranges. Also, a new series of key lengths is given for the 1 5/16 to 1⅜ in. range, in Table 5.

Tables 6 and 7, Gib-Head Taper Stock Keys, are the revised American tentative standard B17e-1927. The shaft diameter range, 1 5/16 to 1¾ in. inclusive, has been split into two ranges, as indicated above, and the dimensions for the range 1 5/16 to 1⅜ in. inclusive, are: Square type: Key: 5/16 by 5/16 in.; gib head: 9/16 by 13/32 in. Flat type: Key: 5/16 by ¼ in.; gib head: ⅜ by 5/16 in. Key lengths for this range have been added in Table 7 of the new standard.

The revision of the four original standards was made by A.S.A. sectional committee B17 on Standardization of Shafting, sponsored by the American Society of Mechanical Engineers. Copies of the revised standard may be obtained from the American Standards Association at 45c. each.

Traffic League to Hold Special Meeting

THE National Industrial Traffic League will hold a special spring meeting at the Hotel Gibson, Cincinnati, April 4, on account of the urgency of the national transportation situation. The meeting will consider the special report of the league legislative committee on pending transportation legislation, especially the Eastman proposals to reorganize the Interstate Commerce Commission, and place all forms of transportation — rail, highway, water and air—under its jurisdiction.

National Declares Extra Dividend

PITTSBURGH, March 25.—The National Steel Corpn. declared an extra dividend of 12½c. a share on common stock for the first 1935 quarter, in addition to the regular quarterly dividend of 25c. a share. Both extra and regular dividends are payable April 30 to stockholders of record on April 20. The directors' meeting was moved forward from its regularly scheduled date, April 10, to coincide with the annual stockholders' meeting today, when all directors of the company were reelected.

The seventeenth annual meeting of the American Zinc Institute, Inc., will be held at the Hotel Statler, St. Louis, April 22 and 23. One day will be entirely given over to the industry's galvanizing campaign.

Belgium's Modified Gold Embargo Is Carefully Watched by Steel Industry

WASHINGTON, March 26.—The American iron and steel industry is manifesting deep interest in Belgium's modified embargo upon gold and foreign exchange transactions. It is to be assumed that the Administration likewise is awaiting developments of the policy. For in the event Belgium devalues or depreciates her currency to any appreciable degree, it might well mean abrogation of the treaty recently made between the United States and that country by which sharp reductions in duties on a wide range of American steel products were granted in return for concessions from Belgium.

The treaty carries a specific provision whereby it can be modified or entirely terminated within 30 days in the event that fluctuations in exchange rates are "so substantial as to prejudice the industries or the commerce" of either country. The State Department, which had charge of negotiating the treaty for the United States, drew attention to this provision when it announced that the treaty had been signed. It has not as yet gone into effect. It would become effective upon proclamation by the President simultaneously with official publication by Belgium.

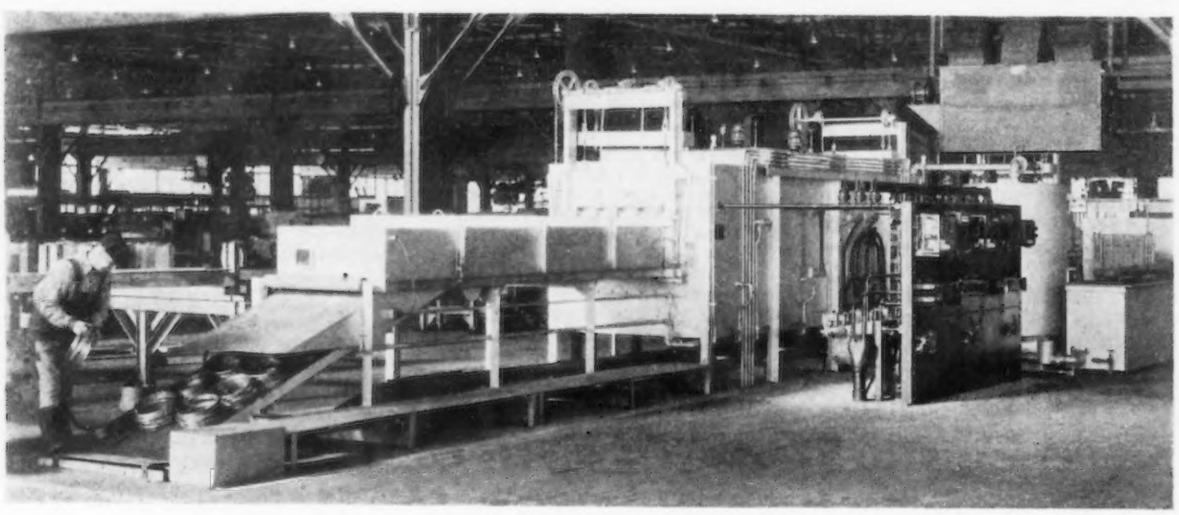
Already unable to meet competition with some lines of Belgian steel in its own home market, the American industry is seriously disturbed over the slash in duties on steel granted in the treaty. To extend the prospective invasion of Belgian steel through devaluation or depreciation of the belga has added to the concern shown over the probable effect of the treaty. It is also pointed out that the treaty would apply to all steel producing countries, with the single exception of Russia, an exception that is unimportant inasmuch as Russia does not export steel to the United States.

Belgium's low cost of production by reason of cheap labor, as contrasted with the high cost of production in the United States with its much greater labor costs and shorter hours, manifestly handicaps the domestic iron and steel industry under existing conditions with protective duties remaining as they are. The protection is cut down sharply under the treaty provision. But it would reach the vanishing point if Belgian currency is devalued or depreciated. Obviously a cheaper belga would reduce Belgian costs and increase the purchasing power of the American dollar for Belgian importations. At the same time it would reduce whatever chance, if any, there may be of increasing American exports to Belgium. The relationship of exchange would be upset distinctly to the disadvantage of the United States.

The move of different European countries toward further devaluation of their currencies is believed in some informed quarters here to be designed to build up their foreign markets, including the American market, and at the same time to protect their home markets. The battle of currencies, in the view of some, is becoming more intense.

It has been pointed out in this connection that Great Britain had no hesitancy in recently increasing by 50 per cent the import duties on certain iron and steel products. This move of "free trade" Britain is understood to have been made to protect the British iron and steel industry against further competition from Belgium.

While youthful King Leopold has apparently succeeded in holding his country to the gold standard for the present, the political and economic conditions in Belgium are so uncertain that he may not be able to continue. Moreover, holding to the gold standard does not necessarily mean avoidance of devalued currency. France held to the gold standard but devalued the franc to about one-fifth of its old standard. Another example not so striking is the United States. At least some authorities say the United States remains on the gold standard. Others say quite differently.



"THIS continuous, controlled-atmosphere, electric furnace for bright-annealing copper tubing was designed and built by the Electric Furnace Co., Salem, Ohio, for the Cleveland plant of the Chase Brass & Copper Co. It is capable of handling copper tubing in coils up to 30 in. in diameter by 10 in. in height, and also straight lengths up to 35 ft. The material is carried into and through the heating and cooling chambers of the furnace on a continuous mesh belt conveyor supplied by the Wickwire Spencer Steel Co., New York. When this picture appeared in THE IRON AGE of February 21, 1935, page 28, the name of the furnace builder and that of its owner were inadvertently omitted."

PERSONALS

W. W. POWELL, general sales manager, and J. R. BERG, general superintendent, Mesta Machine Co., Pittsburgh, have been elected directors of the company to succeed C. M. HIGBIE and J. C. HORNING.

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C. MORRIS JOHNSON, chief chemist, Crucible Steel Co. of America, New York, has been elected to membership in Sigma XI in recognition of his contributions to the chemistry of steel analysis, control and manufacture.

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W. H. SPOONER, who has been identified for the past 18 years with the Arthur C. Harvey Co., Boston, has been appointed New England district sales manager of the Central Iron & Steel Co., Harrisburg, Pa. He will have his headquarters in the Statler Office Building, Boston.

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CHARLES L. TAYLOR, president of Taylor & Fenn Co., Hartford, Conn., has been elected a member of the board of Landers, Frary & Clark, New Britain, Conn.

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FRANK E. BLANCHARD, formerly manager of sales, Southeastern States, for the Climax Engineering Co., Clinton, Iowa, has joined the Caterpillar Tractor Co., Peoria, Ill., as a member of the special sales department. He had been connected with the Climax company in a sales executive capacity for over nine years. Mr. Blanchard also served as assistant chief engineer and sales engineer in the industrial division of the Buda Co., Harvey, Ill.

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R. W. FRAWLEY has been appointed manager of sales promotion for the Gulf States Steel Co., Birmingham. He was for many years assistant general manager of sales for the Tennessee Coal, Iron & Railroad Co. He will be assisted by N. G. BRADFORD, who was also previously with the sales department of the Tennessee company.

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S. H. BLACKWOOD, heretofore assistant district sales representative in the New York territory for the Reading Iron Co., has been made district sales representative in Southern territory, with headquarters at 1104 Continental Building, Baltimore. Mr. Blackwood takes the position held for many years by W. J. WHITE, who has resigned. W. N. JOHNSON has been appointed salesman in the New York territory.

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W. WORLEY KERLIN, formerly of the Gray Iron Institute, has been appointed metallurgist of the Meehanite Metal Corpn., Pittsburgh.

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J. D. WISE has resigned as executive secretary of the Foundry Equipment Manufacturers' Association, Cleveland, to become assistant to the vice-president of the Pangborn Corpn., Hagerstown, Md. He was formerly connected with the sales department of the Osborn Mfg. Co., Cleveland. ARTHUR J. TUSCANY, who recently resigned as executive secretary of the Gray Iron Founders' Society, Inc., Cleveland, has succeeded Mr. Wise as executive secretary of the Foundry Equipment Manufacturers' Association and has also become affiliated with other trade associations and code authorities in an advisory capacity.

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N. B. ORNITZ, president, National Alloy Steel Co., a subsidiary of Blaw-Knox Co., has been elected a director of the latter company.

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FORD L. GRIFFITH has been named director of purchases for the Auburn Automobile Co., Auburn, Ind., succeeding Harry Dunn, who died recently. He has been associated with Auburn for the last 14 years, having been purchasing agent for the past six years. ROBERT F. OLIGER will succeed Mr. Griffith as purchasing agent. He has been assistant purchasing agent for the last eight years, and previously was purchasing agent for a custom body manufacturer.

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ALBERT N. KOCH has resigned as manager of warehouse steel sales for the Whitehead & Kales Co., Detroit, to become president of the newly-formed Steel Plate & Shape Corpn., Detroit, which will do a general steel warehousing business and be equipped to fabricate specialty products in steel and other metals. Mr. Koch is a graduate of the Armour Institute of Technology and a mechanical engineer. After service as pursuit pilot in the United States army, he was connected with Joseph T. Ryerson & Son, Inc., in Chicago and Detroit, before organizing the warehouse division of Whitehead & Kales.

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GEORGE P. SPEAR, general manager of the Corbin Screw Corpn., division of the American Hardware Corpn., has resigned and has been succeeded by JOHN S. BLACK. ERNEST E. BALDWIN has been made sales manager to succeed Mr. Black.

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WILLIAM W. COLEMAN, president of the Bucyrus-Erie Co., South Milwaukee, Wis., is engaged on his fifteenth annual visit to Europe for business investigation and to attend the annual meeting of the Bucyrus-Ruston Co., Ltd., British affiliate, at Lincoln, Eng.

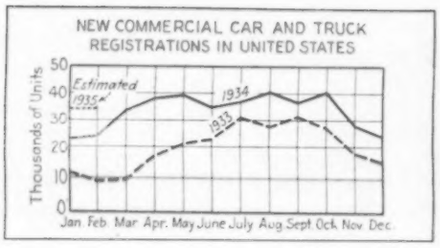
Data For Anti-Friction Bearing Assemblies

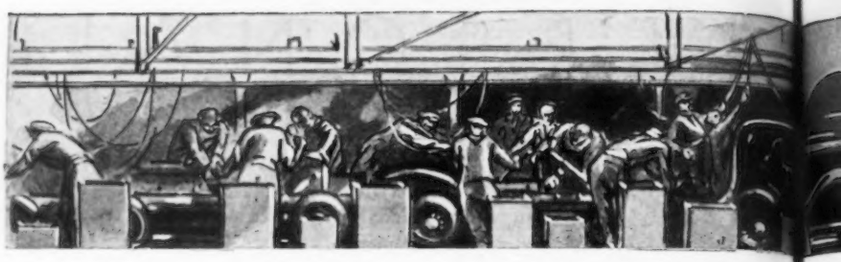
THE Bearing Appliance Co., Ardmore, Pa., makers of covers, caps, spacers, parts and fittings for use in the mounting of anti-friction bearings, have prepared for distribution a series of 9½ by 11-in. loose sheet charts of tabulated assemblies covering standardized use of 14 sizes of covers and mountings for approximately 150 sizes of ball and roller bearings.

The presentations have been prepared in cooperation with Fafnir Bearing Co., Federal Bearings Co., Inc., Hyatt Roller Bearing Co., Marlin-Rockwell Corpn., New Departure Mfg. Co., Norma-Hoffman Bearings Corpn., SKF Industries, Inc., and Timken Roller Bearing Co.

Included are tabulations of typical groups having similar outside diameters and application methods in their use; variations of group parts and applications to accommodate the variations; typical individual data sheets and composite data. The information given also includes bolt fastenings, round or lug-type flanges in 12 variations, shaft extensions, lubricating and cleaning, openings; covers carrying felts, covers with flingers and covers for leather or composition oil seals; shims and gaskets.

Joseph T. Ryerson & Son, Inc., will exhibit the newer steels, alloys, etc., for the Inform-a-Show of the National Purchasing Agents Association in New York during May.





THIS WEEK ON THE

Automobile Industry Continues On High Production Plateau

DETROIT, March 26.

NOTING the part that the motor car industry is playing in a revival of business, an observer recently remarked that recovery will ride in in a caravan of new automobiles. Regardless of what many industrial indices may point toward in the weeks immediately ahead, there is no indication that car manufacturers will retire for at least several more months from the center of the stage.

Unfortunately for the mental attitude of hundreds of suppliers of parts and materials, the industry in January opened wide the floodgates and poured breathtaking orders into their mills and shops. As is always the case, a flood is the result of an abnormal condition, and when that condition is corrected, the flood subsides. That is exactly what has happened in the automotive field. Car makers entered a new season bare of stocks of materials and parts and placed orders right and left. As soon as they had built up a reasonable inventory, the volume of business tapered.

Now that tonnage once more is back within normal bounds, the situation has come as an anticlimax, which is always disappointing. One thing can be said on behalf of the service which the steel industry gave during the abnormal period. Only in isolated cases were hold-ups of motor car production due to failure to secure steel on time.

Substantial Steel Business Ahead

Despite the fact that steel mills dependent on automotive tonnage have experienced a quiet March after a turbulent January and February, business in the offing is of encouraging volume. It is reasonably certain that car output in the second quarter will be well over 1,000,000 units, and a large part of the steel for that period remains unpurchased. There are instances, of course, in which companies will buy less steel than will be consumed in the next three months, choosing to pare current stocks, but these cases are exceptions. The outstanding example is Ford, which is said to have decided to cut down its present 15 to 20-day bank of finished steel to a five-day supply by June 1.

Shifts in manufacturing schedules can be made with such rapidity that predictions for April and May are pretty much guesses. However, automotive sales executives have sized up the situation about in this manner: March retail passenger car sales will show a moderate gain over those of February. In each of the last eight years April sales have topped those of March by a considerable margin, the average having been 31 per cent. Unless weather should be uncommonly bad and retard demand, April therefore should continue the upward trend. The industry will use well-established and effective methods to whoop up sales, such as the General Motors' spring shows in 51 cities starting April 6 and ending May 11, each exhibit lasting a week.

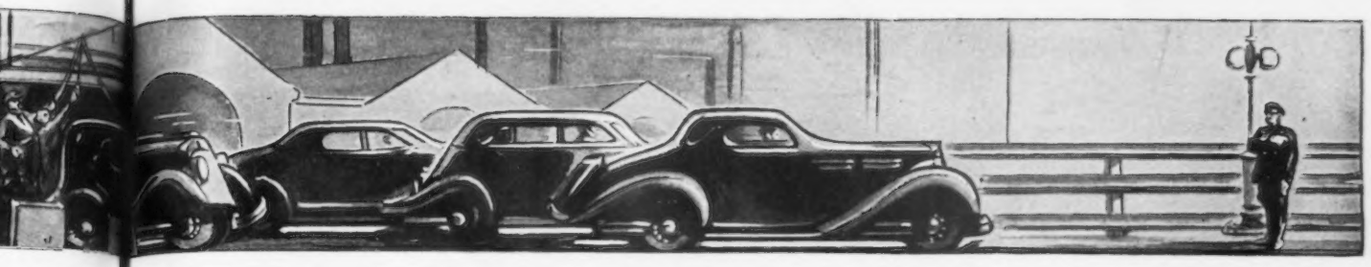
Business Concentrated in Spring

In his annual report to stockholders, President Sloan of General Motors points out that 45 to 50 per cent of the year's retail sales usually are made during the four months of March, April, May and June. This situation should recur this year as it has in the past. Incidentally, people who shake their heads skeptically over the large number of cars currently in dealers' hands possibly aren't aware of the fact that dealers normally go into their peak season with 30 to 45 days supply of cars in stock. They also forget that whereas some manufacturers have been able to put an ample number of cars into the field, others (Chevrolet, Pontiac and Oldsmobile) are entering their best selling period with dealers understocked. Even Ford, with a first quarter production of 400,000 units, is understood to be several weeks behind in making deliveries of some models. Two-door sedan bodies, in the building of which vexing delays are said to have occurred, are now being turned out at the Rouge body department at a rate of 2400 a day.

It is doubtful whether the industry's weekly output, at close to 100,000 units, will go higher. Indications are, however, that it will stay at or near the present level for about a month before it begins to recede. March still looks good for a minimum of 415,000 units, with April looming ahead as the peak production month of the year. Assemblies next month should be at least 435,000 units. The upward swing in General Motors volume in the second quarter will receive most of its impetus from Chevrolet. Although reports have it that Ford intends to chop down operations somewhat in April, it can be reliably stated that an increase to 168,000 units still is scheduled.

Chevrolet Passes 5000 a Day

Chevrolet, on the other hand, passed 5000 a day on the way up on March 19, hoping to get around 110,000 units this month. Next



ASSEMBLY LINE

By BURNHAM FINNEY
Detroit Editor, THE IRON AGE

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month it expects to assemble at least 125,000 cars and trucks, and perhaps more. A spurt in truck business, partly from the Federal Government, is reported to have boosted Chevrolet's truck production to 20,000 units a month during April, May and June. Releases of many parts and materials, including steel, for the truck job have been advanced a week, with rush shipment requested in certain cases.

Pontiac, at about 18,500 a month, and Oldsmobile, at 17,000, are expected to push assemblies up slightly next month. Cadillac will be busier as it gets into higher operations on its new LaSalle line. So will Packard on its 120 car. Hudson, which has been making about 500 Terraplanes and Hudsons a day, five days a week, has increased to 700 a day. Studebaker is building around 1300 cars a week and Graham 1200. Nash is getting ready to introduce a new line which it is reported will be sandwiched in between LaFayette and Nash in price and probably will bear the Nash name.

Chrysler Corpn. continues to adhere to its program of manufacturing about 70,000 units this month, according to authentic reports. Tentatively that figure has been fixed upon for April and likewise for May. Plymouth is counting on new "business" or standard models, three in number, to help stimulate sales and to keep production up. It also is introducing a dual-purpose commercial sedan designed as a light delivery car during business hours and as a pleasure car at other times. In addition to the two side doors, the car has a rear door, 34½ in. wide and 42½ in. high, which fits into the tapering rear deck without detracting from the general streamlined appearance. For conversion into a commercial unit, the rear seats are taken out and replaced by a floor with 2700 sq. in. of space. Panels are snapped into position inside the rear windows to protect the glass and provide a place for commercial signs.

Plymouth currently is building 1800 cars and 2400 motors a day, five days a week. Its retail sales have been near 8000 units a week, or about 1000 less than its production. Dodge is still making 1000 passenger cars a day and 300 trucks. The Dodge plant, where many parts for all Chrysler-made cars are fabricated, has asked some suppliers to slow down deliveries because of congestion at loading platforms. The Dodge truck plant addition on Lynch Road, Detroit, announced in this column a week ago, will cost $250,000.

The trend toward larger automotive stampings promises to continue, and it is believed that car manufacturers will not be satisfied until they can secure from mills a sheet large enough to stamp the entire side of a car. On the other hand, it is possible that other means will be found to give the industry what it wants without some day rolling sheets 100 in. or wider. The practice of automotive companies of welding two sheets together and then blanking one large piece in a press is not new. What is new, however, is an experiment now being conducted by a steel company (supposedly in cooperation with an automotive concern) to weld together two sheets at the mill and then normalize the welded sheet to make sure that the grain structure is uniform. Other finishing processes also are said to be given the wide sheet before it is shipped from the mill. There is understood to be a strong possibility that this method may prove workable. Two 48-in. sheets, then, could be welded together and used in the same manner as if a 96-in. sheet had been rolled at the mill.

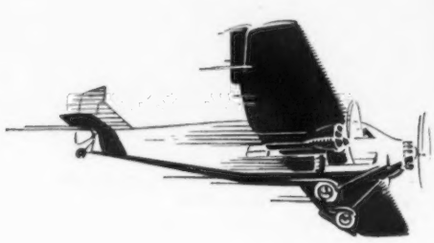
While all car manufacturers except Ford stand committed to fall announcements, President Sloan of General Motors warns that "a mere shifting of the time of new model introduction cannot of itself prevent fluctuations of production and employment." He says further that the problem of forecasting the annual volume of consumer demand by models and body types is the most difficult problem involved in the regularization of employment and production and "is impossible of complete solution." It is evident from this pronouncement that the industry doesn't want the impression to get out that the buying public is going to make a radical shift in its purchasing habits just because cars are announced before Dec. 1 as against Jan. 1.

Buick long was the first General Motors division out with new models. It again will resume that distinction when the 1936 season arrives. The deadline set for new models by the Automobile Manufacturers' Association is Aug. 1 and it is believed that Buick's line for next year will make its debut shortly after that date. Cadillac probably will be the next to follow along. Chevrolet, Oldsmobile and Pontiac probably won't announce their products until about Nov. 1, when most of the companies are likely to show their new cars. Incidentally, Chevrolet is of the opinion when the year is out that one Standard car will have been sold for every two Masters. The Standards are strong in small towns and the Masters in the larger cities.

In its annual report, General Motors does the surprising thing of revealing executive salaries without naming actual recipients. Two hundred and forty-five individuals receive salaries of $10,000 and over. Of that number two get $100,000 to $120,000, one $80,000 to $100,000, eight $70,000 to $80,000, one $60,000 to $70,000 and five $50,000 to $60,000. Salaries of all these executives involve a cost equivalent, after allowance for federal income taxes, to 7c. a share on outstanding common stock.

The illustration shows a lead cast from the cavity of the forging die — an absolutely unretouched photograph. The piece is approximately 27 inches long. It is the product of a famous die shop, and is typical of work turned out constantly on Pratt & Whitney No. 2A Universal Die Sinkers.

THIS ALLOY STEEL FORGING IS FOR A 1935 AEROPLANE LANDING GEAR . . .



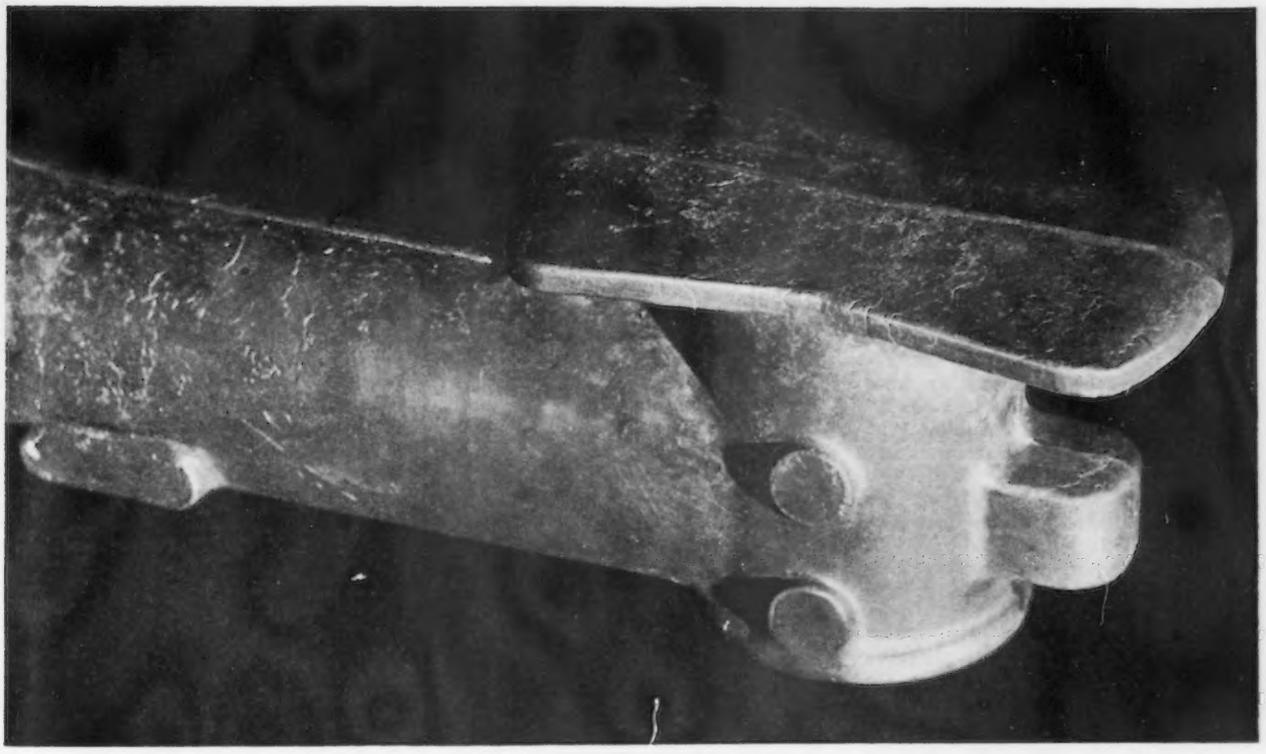
THE DIE THAT PRODUCED THIS WAS CUT ON A PRATT & WHITNEY No. 2A UNIVERSAL DIE SINKER AT A 50% SAVING

THE 27-inch cavity was sunk in a pair of die blocks 34 inches long, 12 inches wide and 18 inches deep. Each block weighed 2000 lbs. The manufacturer said that his 50% saving was due entirely to the P&W No. 2A Universal Die Sinker.

If you make forging dies you need this machine. It produces either straight or cherrying cavities with ordinary die sinking cutters, and does it with astonishing speed. It leaves such a fine finish that frequently hand polishing is not needed at all. It is the best paying investment a die shop can make.

If you buy forging dies, go to the die shop that has this machine. You will pay less for better dies, and get them quickly. Let us send you the details of the P&W No. 2A Universal Die Sinker. You can see for yourself why this machine, different in principle, is rapidly replacing all obsolete die sinking equipment.

WRITE FOR LITERATURE



PRATT & WHITNEY CO.
HARTFORD, CONN.

THIS WEEK IN WASHINGTON

Steel industry's opposition to Wagner bill is ably presented by employees as well as operators.

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Darrow's testimony before Senate committee fails to provide fireworks anticipated by NRA foes.

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Belgian financial crisis may lead to revision of reciprocal trade agreement before it becomes effective.

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Organized labor believed to have been promised Administration support for Wagner bill in return for "certain concessions."

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Industry gets able spokesman on reorganized NIRB but organized labor is also given new member.

° ° °

BY L. W. MOFFETT

Resident Washington Editor, The Iron Age

° ° °

WASHINGTON, March 26.—Clarence Darrow told the Senate Committee on Finance that he might be an idiot but that he was not a cheerful idiot. It would be an idiot who thought or said Mr. Darrow is any kind of an idiot. . . . Enfeebled physically though the 77-year old lawyer-socialist-crusader is, his mind still flashes the brilliancy of earlier days and notable triumphs in the courts . . . and in the Darwinian "trial," the one-time "boy orator of the Platte," the redoubtable William Jennings Bryan, was a foe worthy of his mettle. . . . Almost cruel, it seemed, to call the tired Darrow to Washington, but he must have been repaid if a mere crowd and applause compensated him. . . . Which is doubtful for one so long accustomed to both. . . .

Unless it was a pose, and if it were it was finished acting, Darrow was jaded by his entire surroundings. . . . His testimony was tame. . . . His blast that the NRA investigation is a whitewash may have been too strong, but he will find support for the sentiment. . . . As he will find even more support for his view that the nation would be better off without codes, and for his statement that NRA was gotten up to help big business. . . . He also will be strongly challenged on all these points. . . .

In telling briefly the sorry story of the so-called Darrow Review Board, which really was a board of persecution, he uttered some homely truths that must have astonished brain trusters and their camp followers who have outmoded natural laws, the constitution and other relics that hamper their path to Utopia. . . . To them the dour Darrow must have been at times one of those Neanderthal men of whom General Hugh S. Johnson has spoken occasionally in the past, although some of his hecklers now classify him in that same species. . . . For Darrow actually enunciated the law of supply and demand, bold soul that he is. . . . A law, mildewed and cast aside for these past two years, although partially resurrected by the impelling force of a devastating dust storm that prompted a generous Department of Agriculture to tell farmers the sky is the limit on wheat planting—for this season anyhow. . . .

Darrow said: "The price of labor is fixed, like everything else, by supply and demand." . . . Rank heresy that it was, Darrow added salt to the sore when he declared further that if NRA expired June 16, it would help labor and that he did not think it possible to make collective bargaining provisions work. . . . It must have been because of enjoyment in twitting his personal friend and escort, but political and social dissenter, Donald Richberg, that Darrow turned frequently to the latter to get his recoil as Darrow expounded opinions quite contrary to those of

Mr. Richberg. . . . For instance, Darrow said he did not think Congress could regulate industry solely within a State. . . . Richberg has given the Federal Government tremendous powers, in his speeches, to regulate intrastate commerce . . . In his full-throated broadcast the other night assailing the Old Guard, the destroyers, the press and his erstwhile playmate, General Johnson, Richberg cited a Supreme Court decision to show the sweeping power of Congress over intrastate commerce. . . . To which some have replied a swallow does not make a summer. . . . But it was forgotten until recently that there is such a thing as Congress. . . . It has now made its presence known, however, by its lusty soundings of many unsound things, and its conversion from a rubber stamp to an animated object also has been revealed by its occasional bucking of the White House. . . . But the White House delivered Congress a blow in putting over the public works "relief" measure with its dazing appropriation of $4,880,000,000 . . . an astronomical figure that would seem fantastic were it not for the inevitable forthcoming heavy tax levies . . . or even worse, inflation. . . . It's an enormous load of responsibility to take, the handling of this huge sum, for the President alone cannot keep an eye on the ugly possibilities that lie in its expenditure. . . . Even some of the most staunch New Dealers, recalling the grievous experience of PWA, think it will be a failure as a "pump primer," and that it will only retard private initiative . . . that it would have been much better had provision been made only for actual relief, directly furnished, difficult though the task is. . . .

What, again? or yet? . . . Unless the Wagner labor disputes bill becomes a law "workers will have only one recourse to obtain their right—strike, or the "use of their economic power," so President William Green of the A. F. of L. told the Senate Labor Committee . . . which reflects complete absence of news . . . a many-times told tale. . . . Nor was it news that political expediency sent the 30-hour-week labor bill to the Senate. . . . President John L. Lewis told the committee that Mr. Richberg had knifed labor by the latter's interpretation of Section 7-a, giving rights of collective bargaining to the minority. . . . So while Richberg fires broadcast and broadcasts fire at Old Guard, destroyers, Johnson & Co., more grape is turned in his direction, including the General's jaunty comeback before scrap dealers in Chicago that "Mr. Richberg once had ants in his pants. Now he has tarantulas." . . . This ought to complete the cleavage in the former NRA lead team and lend color to claims . . . perhaps coming from a wishful Old Guard . . . that a Kilkenny cat fight is developing in the New Deal family. . . .

In any case these differences must not provide pleasant thinking for a President who is showing increasing signs of being tired, less cheerful and even short in some of his replies, in sharp conflict with his natural abounding good nature. . . . A former President once said no one but the President knows the burdens of the Presidency, and he had much less responsibility on his shoulders than does Franklin Delano Roosevelt. . . .

Organized Labor Promised Wagner Bill for So-Called Concessions?

With neither denials nor confirmation forthcoming, reports persist that the Administration has promised definitely to support the Wagner labor disputes bill in return for so-called concessions from organized labor. Such support apparently may mean that the Wagner bill will be enacted despite vigorous opposition from industry generally.

The understanding is that organized labor has promised strong support to the NRA, which is now evident and to call off threatened strikes in the automobile, textile and packing house industries. Agreement to this end is reported to have been reached between organized labor and Administration representatives in return for support of the Wagner bill and the naming of Philip Murray, vice-president, United States Mine Workers, as a member of the reorganized National Industrial Recovery Board. The Wagner bill, however, is to be subjected to "clarification" by the Administration, according to reports.

The greater voice now given to organized labor in the NRA through the selection of Mr. Murray as a member of the recovery board meets an insistent demand coming from its leaders that it be given equal representation with industry. Sidney Hillman, president, Amalgamated Association of Clothing Workers, and Mr. Murray now constitute the direct organized labor representatives on the NIRB. Labor support can also be expected from C. Marshall and Walter Hale Hamilton, although they do not always accept organized labor's views.

Mr. Murray is reported to have been selected upon recommendation of members of the NRA Labor Advisory Board, among whose members are President William Green of the American Federation of Labor and President John L. Lewis of the United Mine Workers.

Tariff Commission Submits Data Relating to Belgian Trade Agreement

The United States Tariff Commission has issued a "Digest of Trade Data with Respect to Products on which Concessions were Granted by the United States in the United States-Belgo-Luxemburg Trade Agreement." Numerous iron and steel articles were included in the list on which the United States agreed to reduce duties in exchange for concessions from Belgium.

The commission document contains 360 mimeographed pages and presents for each product on which a concession was made by the United States a brief, factual statement setting forth the pertinent data with respect to production, imports, exports and other trade factors. Included in the report is an explanation of the changes made in the United States rates of duty, accompanied by an analysis of imports in recent years, showing the significance in the total trade of each article on which a concession was made and in the total trade under the particular tariff schedule affected.

The commission said the material was drawn from a large volume of information made available by the commission to those having trade agreement programs in charge and was prepared in response to request for information received from those interested in the products covered by the agreement.

Study of Pig Iron Imports Being Made

Acting upon a complaint of merchant blast furnaces interests along the Atlantic seaboard that increasing imports of pig iron from the Netherlands and British India threaten to render ineffective the code for the iron and steel industry, the import section of the NRA Research and Planning Division has started an investigation. Domestic producers charge that their markets are being threatened through direct competition from iron originating in the two foreign countries.

The NRA study embraces the trend of production, costs, etc., of domestic furnaces as compared with the landed costs of the foreign iron. When the study is completed it will be laid before the

National Industrial Recovery Board which will forward the report together with recommendations to President Roosevelt. He is empowered to increase the present duty of $1.12½ up to 50 per cent, if he sees fit.

Armor Plate Bids Opened

The Bureau of Ordnance, Navy Department, has opened bids on 3724 tons of armor plate for the heavy cruiser *Wichita* and the light cruisers *Phoenix*, *Boise* and *Honolulu*. Tonnage on which each bidder was low was as follows: Bethlehem Steel Co., 2240 tons; Midvale Co., 1259 tons, and Carnegie Steel Co., 225 tons. The *Wichita* and *Honolulu* are being built at the Philadelphia and New York navy yards, respectively, while the *Phoenix* is being built by the New York Shipbuilding Co., and the *Boise* by the Newport News Shipbuilding & Dry Dock Co.

Inflation, Upped Prices And Higher Taxes

Inflation, further increase in the cost of living, and boosted taxes are shadows which lie athwart the country as the result of the irresponsible antics of Congress last week. The Patman bonus bill, swept through the house by a three to one vote, may mean greenbackism. Politely, it means that the Treasury would issue $2,000,000,000 in non-interest bearing United States notes, without metallic reserve back of them, for immediate redemption of adjusted-service certificates.

The all-time record appropriation of $4,880,000,000 was voted into the hands of the President by the Senate as a works relief fund, and tied with it was more fiat money. For into the huge appropriation bill went the rider offered by Senator Thomas of Oklahoma providing for mandatory issuance of silver certificates at full monetary value of bullion, $1.29 an ounce, and calling for continuous circulation of silver notes.

Even the mania for greenbackism, and for political expediency in yielding to the bonus lobby, which has thrown the country into one of its most serious crises in its history, would have gone further if there had been only a little more power back of some of the crackpot proposals made in both houses. Both Democrats and Republicans rushed to the political bandwagon and shared in the orgy of legislative quackery. The New Deal itself was opposed to the

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NIRB Reorganization Adds New Members for Labor and Industry

WASHINGTON, March 26.—Reorganization of the NIRB into a seven-man board, with Donald R. Richberg as its temporary head, and with an additional organized labor representative, was followed by reports that it carried with it Administration support of the Wagner labor disputes bill. Neither confirmed nor denied, the report has been given weight by the declaration of Mr. Richberg that he is personally convinced that separate and adequate machinery is necessary for investigation and enforcement of Section 7-a, the collective bargaining provision of the National Industrial Recovery Act. Administration support would undoubtedly mean enactment of the Wagner bill into law.

While Mr. Richberg took occasion to point out that he "has kept away" from the Wagner bill and has not read it in its present form, he expressed the view that the bill answers the purpose so far as it concerns providing machinery for enforcement of the section. The bill actually is not much different from the measure which Senator Wagner introduced at the last session. It still provides for the setting up of a general board with regional boards given broad power, and would abolish "company-dominated unions." It is strongly supported by organized labor. The heretofore lukewarm support given the NRA by organized labor is in marked contrast to its present advocacy of extension of the Recovery act, as made clear at hearings before the Senate Finance Committee.

WILLIAM P. WITHEROW, newly appointed member for industry on the National Industrial Recovery Board, was one of the founders and for many years president of the Witherow Steel Corpn., Pittsburgh. After that company was merged with the Republic Steel Corpn., he served for a time as vice-president of the latter company. In 1933 he became head of the Steel Products Co., Pittsburgh, where he remained until August, 1934, when he became a member of the Industrial Advisory Board to the NRA, with headquarters in Washington.

The desire of the Administration to extend the act for another two years undoubtedly is given much strength by the active efforts of organized labor, which have been intensified by the appointment to the NIRB of Philip Murray, Pittsburgh, vice-president of the United Mine Workers of America. His selection as a member of the board brings the representatives of organized labor on the NIRB to two, the other being Sidney Hillman, head of the clothing workers' union. In addition there are other members of the board whose leaning toward organized labor is well known.

The reorganization of the board was effected as a result of the resignation of S. Clay Williams as chairman; sent to the President some two weeks ago, but not made effective until Mr. Richberg was chosen to take his place. Mr. Richberg will remain as head of the board until Congress takes action toward extension of the recovery act. He also said he would likely remain as Administration member of the steel code authority.

Witherow Named To Board

The other new member of the board is William P. Witherow, Pittsburgh, former president of the Witherow Steel Corpn., and member of the NRA Industrial Advisory Board. His appointment was made to balance the selection of Mr. Murray. Another appointment will be necessary also in view of the pending resignation of A. D. Whiteside, New York, head of Dun & Bradstreet, Inc.

The President, in announcing reorganization of the board, said Mr. Whiteside would be replaced

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Steel Employees Join Company Officials In Protesting Enactment of Wagner Bill

WASHINGTON, March 26.—In a final effort to halt the passage of the Wagner labor disputes bill, the steel industry today made a vigorous protest before the Senate Committee on Education and Labor. Also determined to oppose the measure were a number of workers who came to Washington as spokesmen for employee-representation groups.

The force of the steel industry was probably an important factor in halting passage of the bill at the last session of Congress. In its stead the President had Congress enact a joint resolution setting up several labor boards, among them the National Steel Labor Relations Board. The situation is quite different now. Organized labor, angered at the shelving of the bill, has meanwhile persistently lobbied for it, and is frankly believed to have succeeded. From present indications the bill will be enacted at this session. The belief that all opposition will be unavailing is by no means official but is apparently well grounded.

The Administration is reported to have thrown its support back of the Wagner bill. No denial of this report has been made, and support of the bill is said to have been promised in return for so-called "concessions" from organized labor, including the alleged promise not to start strikes in the automobile, textile and meat packing industries. While this sounds almost fantastic, it has not been denied and is given credence in at least some quarters.

The Wagner bill was attacked because of its broad powers and certain features which are fundamentally opposed by the steel industry. Its board would have power of subpoena of witnesses in the enforcement of Section 7a. This board could determine what constitutes "company dominated unions," which the bill would abolish. Obviously, a board unfriendly to the open shop would be expected to do away with all company unions as being "dominated" by employers. The bill also would definitely legalize the majority rule in collective bargaining. All of these outstanding features of the bill are strongly opposed by the industry.

Strong opposition to enactment of the Wagner bill on the ground that it would stir up industrial conflict throughout the country and retard business recovery was voiced in a statement last week by the American Iron and Steel Institute.

"The measure rests upon the false and un-American theory that harmony and cooperation is impossible between employees and employers," says the Institute's statement. "More than that, it is designed to prevent any such cooperation. Its enactment would set the stage for a conflict which would injure the relations between employees and employers for all time and seriously retard national recovery.

"One of the most destructive effects of the bill would be to strangle employee representation plans which have been in satisfactory operation in numerous industries for many years and are mutually desired by employees and employers. The bill is a definite legislative attempt to force employees to organize only through outside organizations to which they must pay dues.

"This makes it quite clear that the interests of the employees themselves are a secondary consideration of the bill, the first being that of professional labor organizations.

"Such labor organizations are left free from any restrictions under the bill. They can interfere, coerce or intimidate employees at their will. Quite properly, of course, employers are prohibited from coercion or intimidation, but if the measure had the interests of employees at heart, coercive methods of any sort and from any source would be prohibited.

"At the present time, peaceful relations exist in the steel industry between employees and employers as a result of the orderly working in practically all plants of employee representation plans. A recent industry-wide survey showed that from 85 to 90 per cent of the more than 400,000 steel workers in the country are standing behind their employee representation plans of collective bargaining.

"By contrast, records made public at the annual American Federation of Labor convention at San Francisco in October, 1934, showed a total paid membership in the Amalgamated Association of Iron, Steel and Tin Workers of only 5500 steel company employees, or less than 2 per cent of the total of more than 400,000.

"The records of employee representation plans in the steel industry reveal that thousands of questions have been settled quietly and in an orderly manner. That the plans operate to the benefit of employees is indicated by the fact that 71 per cent of all cases were settled in favor of the workers. As might be expected, more of the questions arising under the employee representation plans had to do with wages than with any other subject.

Committee Hostile

The entire Senate committee sat at the hearing, over which Senator David I. Walsh, of Massachusetts, its chairman, presided. Senator Wagner, author of the bill, but not a member of the committee, also participated in the hearing. The steel executives testifying were questioned but little, and Senator Walsh tried to assure them that the Wagner bill does not require union organization and that there is nothing in it to prevent organization of company unions. They did not appear to be impressed by the gesture.

Senator Wagner took a like attitude in his examination of employee representatives, who were especially concerned lest the bill abolish their organizations. The employee witnesses were invariably asked if they expected the management to pay their expenses for coming to Washington. The motive of this and related questions was apparently to show "company" influence to compel favorable evidence for the open shop. Witnesses invariably denied that they had been influenced by the management. The attitude of the committee was patently hostile to the employee representation plan.

Steel Corporation Files Brief

Prior to the taking of testimony, a brief was filed by R. E. Desver-

nine, counsel, United States Steel Corpn., and statements were submitted by J. M. Larkin, vice-president, Bethlehem Steel Corpn., and Grover E. Brown, American Iron & Steel Corpn.

The Steel Corporation brief cited the limited rights of collective bargaining purported to be guaranteed by the Wagner bill and said that they were further confused by the definition of the term "employee" contained in Section 2, Subdivision 3. The bill says that an employee, if he ceases working in consequence of a labor dispute, continues to be classed as an employee until he finds regular employment, even though the dispute may have been settled for a considerable length of time.

"Any such definition," the brief said, "will prevent an employer from knowing who his employees are, and will prevent the employees actually working in the plant from knowing who their fellow employees are and possibly from carrying out the wishes of a majority of those who are actually the employees. . . ."

The brief declared that the general objection to the bill is that it is designed to prevent any cooperation between an employer and his employees. Instead it is designed to throw them into controversy and fails to set forth certain basic rights of employees and impose penalties for violation of those rights of employees. The brief also attacked Section 9, which "effectively establishes the 'majority rule.'" It was declared that Section 7-a in the recovery act guaranteed the right of collective bargaining to all employees and thus to each employee. Each employee, it was stated, was free to join with such employees as he chose and equally free to refrain from joining any employees that he did not choose to join.

"Under this bill, however," said the brief, "the employee has no option as to whether or not he will join in such group organization. The labor board sets up limits of the district, area or plant, and when the area has been so specified by the board, all employees, whether they like the district or not, must abide by the majority rule in that district. The section does give to minorities the right of presenting their grievances, but there is no need of any statutory provision to insure that right. Even if there were, there is no reason why the minority forced into an artificial group should not, equally with the majority, have the power to deal and bargain with their employer. Certainly there is no reason if the fundamental purpose is to protect the interest of the employees."

Cites Bethlehem Employee Relations

Mr. Larkin, in his statement, declared that during the last year some 800 major questions having to do with hours, wages and working conditions have been adjusted under employee representation plan of the Bethlehem company to the mutual satisfaction of employees and employer. Annual elections, he said, have just been completed wherein 45,876 employees have chosen 429 spokesmen to represent them in dealing with the management for the coming year.

"In such elections," said Mr. Larkin, "which have been conducted by the employees themselves, 91.7 per cent of the 45,876 workers operating under the employee representation plan cast their votes." In view of this showing it would be a calamity to allow anything to be done through legislation or otherwise that would in any way undermine these plans.

Employee Denies Company Domination

Possibly the most effective testimony offered at the hearing was that of Jack Larkin, spokesman for the employee representation plan at the Weirton, W. Va., plant of the Weirton Steel Co., who told the committee that his group is absolutely independent of company influence and that he resented the use of the phrase "company dominated union" in the Wagner bill. He was a brisk witness and forthright in his statement. He recited in detail what the employees obtained in the way of wages, hours and working conditions. He objected strongly to the provisions which would prevent the company from paying any of the expenses of "such an organization as ours."

Discussing this point, Mr. Larkin asked: "What good reason is there why the expense of such an organization should not be paid by the company? We contribute to the income of the company; it's our labor and services that bring in the money, and the fact that a small part of it is set aside for the use of our organization is perfectly fair and just. The total expense of maintaining this plan does not amount to more than one-fourth of one per cent of the payroll of the company. The company has nothing to say about who gets the money. The employees choose the representatives. How can it be said that the company has any control over the organization at all by reason of the fact that it pays this sum of money over for the use of the organization?

"An expenditure of one-fourth of one per cent to maintain peace and harmony for the company, settle grievances and adjust wage disputes, is no unfair burden to the company, and if placed upon the men it does work a hardship. Some of the men receive low rates of pay, and even a couple of dollars a month dues to such men is a burden. Furthermore, why should any employee have to belong to an organization in order to have his grievances redressed? Why should not every employee in the mill have the right to vote for the persons who are going to represent him, without the necessity of belonging to some national union and contribute to the war chests of the American Federation of Labor?

"Why should any employee have to submit to the fines and assessments levied by a national union in order to have some say about the affairs of the employees of the company he works for? Under our system every man in the mill is entitled to representation. He can present any grievance he has, and it doesn't cost him a cent.

"You would think to hear the arguments that are advanced criticizing the fact that the company pays the expenses of the employee organization that it had the power to pay one man and not another, or to pay or withhold pay, as it saw fit, for the purpose of influencing the votes of the representatives. That is absurd. The ultimate source of the money paid in by the members of a labor organization is from the employer, and I cannot see what difference it makes whether the company turns over a lump sun each year, according to a fixed arrangement, or whether the men pay a check-off, which is the system which the A. F. of L. wants. In the latter case it comes out of the men's salaries.

"A Federal judge gets a fixed salary. It comes from the United States. Would anyone say that he was prejudiced in favor of the United States in deciding a case because his salary happens to come out of the United States Treasury? As long as his salary is fixed and cannot be taken away from him. he is independent. It is the same situation with our representatives. The amount they get per month is far less than the time they actually spend in their duties as representatives, and neither the company nor anybody else can deprive them of that compensation.

"The men can elect anybody as a representative that they wish, even an outsider, and if William

Green were elected a representative under our plan, he would be entitled to his $25 a month, just the same as anyone else. How it can be said that this is a method of dominating or controlling the representatives, I do not see. Judge Nields found this was not company domination. The only reason the A. F. of L. would like to get that clause in this bill is because it thinks these organizations of employees, to which an employee may belong without being charged dues or assessed fines, interfere with its revenue.

"I cannot think that the Government wants to lend its assistance to help force the working men of the country to pay tribute to the A. F. of L. A great many more men belong to independent organizations, so-called 'company unions,' than to the A. F. of L. If these employee representation plans had the high paid lobbies in Washington that are maintained by the Federation we could bring thousands of men here to complain of this proposed bill, but I believe that you men intend to protect the rights of the workers who want their own organizations."

It was considered significant that not a single question was asked Mr. Larkin by any member of the committee. "That's all," curtly remarked Chairman Walsh, when the testimony was completed. Apparently it was realized that Mr. Larkin was fully prepared for examination. A chuckle went through the crowd as he was dismissed.

Objections to Bill Enumerated

E. J. Poole, vice-president, Carpenter Steel Co., Reading, Pa., the first witness heard, told the committee that the Wagner bill has many provisions that will hamper, delay or even prevent the promotion of understanding, the fostering of fraternity, the development of personal interest among the workers and National recovery. Enumerating his objections, Mr. Poole said:

(1) The bill proposes a new National Labor Relation Board, subject to politics, which may create strife and retard recovery and would further project the Government into the field of private employment relations.

(2) The bill imposes the "majority rule," which means that representatives of the majority of the employees have the exclusive right to bargain with management. If an individual or a minority group is not satisfied with its wages, hours, or working conditions negotiated by the majority, there is no recourse or appeal except in the case of grievances.

(3) The National Labor Relations Board could intervene in the election of representatives. It could call special elections when its favorites were "out" and then refuse to call elections after they were "in."

(4) The bill provides that the majority may negotiate a closed shop agreement with the employer. If such an agreement were negotiated, all the employees would be forced to join the labor organization of the majority or lose their jobs. In plainer words, it legalizes closed shop arrangements, under which 49 per cent of the workers could be thrown into the streets unless they joined a labor organization favored by the 51 per cent.

(5) The bill discriminates in prohibiting coercion of employees by employers and not by labor organizations or fellow-employees.

(6) It does not limit the right to strike, nor require a favorable vote of employees before a strike is called, nor provide a notice to the employer and a waiting period before executing a strike.

"There is something fundamentally wrong with an industry," said Mr. Poole, "that requires the intervention of any agency not directly interested in the enterprise itself in order to safeguard the welfare of those who are engaged in its operations. The workers who contribute their labor to a given business, the individuals who invest their savings in the undertaking, and those who direct its operations and policies must all receive their return from the earnings of the enterprise. It is to their common interest that those earnings should be maintained at the highest level attainable, in order that participation of each may be a maximum in amount."

Mr. Poole added that the present employee representation system is furnishing a satisfactory disposition of the so-called "labor problem."

Would Promote Industrial Conflict

W. C. Sutherland, vice-president, Pittsburgh Steel Co., Pittsburgh, reiterated Mr. Poole's objection to the legislation of majority rule and the closed shop as being grossly unfair to the minority group of employees. Continuing, he said that "the Wagner bill is urged by its advocates as a measure to promote industrial peace but the practical results of its passage would be to set the stage for conflict which would retard national recovery and injure employers and employees as well as the public.

"The bill, by specifying certain acts to be unfair labor practices, shows its bias in favor of professional labor unions," he said. "It is designed only to further the advancement of these organizations and impose the closed shop, as is evidenced by the provision that an employer shall not 'interfere with, restrain, or coerce employees in the exercise of the rights guaranteed in Section 7-a.' No such restraint is placed upon fellow employees or labor representatives.

"The provision of the bill which forbids an employer making contributions towards the operating expenses of the representation plan of his employees is in conspicuous contrast to the absence of restraint upon the amount of dues to be collected by the union labor organizations or upon the use of these funds.

"I am firmly convinced that the foremost desire of labor in the steel industry today is for an opportunity for regular and steady employment and that any legislation, the influence of which will cause a contrary condition, will not be pleasing or beneficial to that large group of people who are most anxious to see the last traces of the industrial depression disappear. For these reasons I protest against the passage of the revised Wagner bill."

Praises Weirton Decision

Charles S. Traer, vice-president, Acme Steel Co., Chicago, cited the general protest against the Wagner bill which he said seems to be predicated upon the fact that the interests of employee and employer must be antagonistic rather than mutual. "I do not think," he said, "that Judge Nields' conclusion from the evidence in the Weirton case could be improved upon. Experience shows that when collective bargaining is controlled by professional unions, there is no possibility of using common sense to arrive at an equilibrium between rate of wages and economic conditions. Regardless of any other factor or condition, organized labor must at all costs maintain maximum rates of pay and usually a strike is the method of coercion selected to maintain such rates, to the detriment of employee, employer and the public at large. The perpetuation of organized labor leaders in office requires that they advocate a maximum wage scale even though they may be convinced themselves that it may be economically unsound . . ."

In addition to his general criticism of the bill, Mr. Traer cited several specific objections. "Paragraph 1, Section 8," he said, "prohibits the employer from interfering with, restraining or coercing employees in the exercise of rights guaranteed in Section 7, but no such prohibition is extended to organized labor. If any bill is to be recommended by the committee, this paragraph should certainly be amended so that it will be an unfair practice for anyone to interfere with, restrain, coerce, etc. It is a well-known fact that principal interference and coercion are not from employers but from outside organizations who will use almost any method to obtain members.

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Monthly Report of Metal Working Activity

These Data Are Assembled By THE IRON AGE From Recognized Sources And Are Changed Regularly As More Recent Figures Are Made Available. Boldface Type Indicates Changes This Week

	February, 1935	January, 1935	February, 1934	Two Months, 1935	Two Months, 1934
Raw Materials:					
Lake ore consumption (gross tons)[a]	2,467,269	2,280,393	1,727,746	4,747,662	3,338,149
Coke production (net tons)[b]	**2,873,432**	2,889,552	2,622,594	5,762,984	5,206,279
Pig Iron:					
Pig iron output—monthly (gross tons)[c]	1,608,552	1,477,336	1,263,673	3,085,888	2,478,899
Pig iron output—daily (gross tons)[c]	57,448	47,656	45,131	52,303	42,016
Castings:					
Malleable castings—production (net tons)[d]	.....	43,400	33,939	.....	64,356
Malleable castings—orders (net tons)[d]	.....	44,568	36,594	.....	69,095
Steel castings—production (net tons)[d]	.....	**28,519**	28,526	.....	56,170
Steel castings—orders (net tons)[d]	.....	**31,816**	35,698	.....	61,994
Steel Ingots:					
Steel ingot production—monthly (gross tons)*	2,742,125	2,834,170	2,182,826	5,576,295	4,154,247
Steel ingot production—daily (gross tons)*	114,255	104,969	90,951	109,339	81,456
Steel ingot production—per cent of capacity*	51.61	47.67	41.31	49.66	36.99
Employment in Steel Industry:					
Total employees*	.....	407,071	403,298	.....	398,155
Total payrolls (thousands of dollars)*	.....	44,328	35,425	.....	35,151
Average hours worked per week*	.....	33.6	33.1	.....	31.6
Finished Steel:					
Trackwork shipments (net tons)*	2,892	2,333	3,310	5,225	6,121
Sheet steel sales—(net tons)[f]	**183,322**	321,831	184,355	505,153	393,818
Sheet steel production (net tons)[f]	**219,062**	235,714	194,830	454,776	358,452
Fabricated shape orders (net tons)[g]	***58,091**	55,857	75,294	***113,948**	166,888
Fabricated shape shipments (net tons)[g]	***60,165**	85,950	47,509	***146,115**	125,132
Fabricated plate orders (net tons)[d]	.....	18,778	14,641	.....	30,538
Reinforcing bar awards (net tons)[c]	22,265	15,600	17,625	37,865	35,425
U. S. Steel Corpn. shipments (tons)[h]	583,137	534,055	385,500	1,117,292	717,277
Ohio River Steel Shipments[hh]	**64,369**	52,656	4,373	117,025	58,142
Fabricated Products:					
Automobile production U. S. and Canada[dd]	**358,658**	303,372	240,278	662,030	404,089
Construction contracts (37 Eastern States)[i]	$75,083,500	$99,773,900	$96,716,300	$174,857,400	$283,180,000
Steel barrel shipments (number)[d]	**402,928**	438,334	572,915	841,262	1,279,262
Steel furniture shipments[d]	.....	$1,139,497	$894,076	.....	$1,890,914
Steel boiler orders (sq. ft.)[d]	.....	391,784	227,093	.....	462,869
Locomotive orders (number)[k]	1	0	20	1	20
Freight car orders (number)[k]	806	24	20,227	830	20,377
Machine tool index[l]	53.0	65.5	50.9	†61.5	†58.2
Foreign Trade:					
Imports of pig iron (gross tons)[m]	**10,741**	2,033	10,777	12,774	22,663
Imports of rolled steel (gross tons)[m]	.....	14,180	6,456	.....	13,639
Exports of all rolled steel and iron (gross tons)[m]	.....	69,491	74,968	.....	165,393
Exports, finished steel (gross tons)[m]	.....	66,523	68,722	.....	147,540
Exports of scrap (gross tons)[m]	.....	186,112	75,884	.....	163,156
British Production:					
British pig iron production (gross tons)[n]	483,100	521,200	414,400	1,004,300	855,700
British steel ingot production (gross tons)[n]	769,500	757,800	707,500	1,527,300	1,542,000
Non-Ferrous:					
Lead production (net tons)[o]	**27,398**	30,674	34,349	58,072	72,919
Lead shipments (net tons)[o]	**32,518**	34,164	25,778	66,682	59,689
Zinc production (net tons)[p]	33,072	35,614	30,296	68,686	63,373
Zinc shipments (net tons)[p]	34,903	35,538	32,485	70,441	59,141
Deliveries of tin (gross tons)[r]	3,905	4,600	2,940	8,505	6,250

* Preliminary. † Three Months' Average.

Sources of figures: [a] Lake Superior Iron Ore Association; [b] Bureau of Mines; [c] THE IRON AGE; [d] Bureau of the Census; [dd] When preliminary, from Automobile Manufacturers' Association—Final figures from Bureau of the Census; [e] American Iron and Steel Institute; [f] National Association of Flat-Rolled Steel Manufacturers; [g] American Institute of Steel Construction; [h] United States Steel Corpn.; [hh] U. S. Engineer, Pittsburgh; [i] F. W. Dodge Corpn.; [k] *Railway Age;* [l] National Machine Tool Builders Association; [m] Department of Commerce; [n] British Iron and Steel Federation; [o] American Bureau of Metal Statistics; [p] American Zinc Institute, Inc.; [r] New York Commodities Exchange.

Business Uncertainty Brings Only Minor Contraction in Steel Demand

Ingot Production Declines One-Half Point to 46½ Per Cent of Capacity as Tin Plate Output Rises to 90 Per Cent—Scrap Prices Again Decline

DESPITE the continued unsettling influence of political developments, steel demand this week reflects only minor contraction. The requirements of tin plate consumers are definitely increasing and buying of other finished steel products is fairly well sustained. It is thus indicated that steel consumption is holding at a relatively high level, as scarcely any material is being stocked by users.

Steel ingot production has declined only fractionally or from 47 to 46½ per cent of capacity. The Chicago and Cleveland districts are the only major producing centers to reflect any contraction this week. Activity at Chicago has declined from 47½ to 47 per cent, while production at Cleveland has dropped from 58 to 54 per cent. Output at Detroit has risen from 83 to 90 per cent. In the Pittsburgh, Valley, Wheeling, Philadelphia, Buffalo and Birmingham districts production is unchanged.

Tin plate production has again been increased and is now estimated at 90 per cent of theoretical capacity. Cold reducing units are running full and are booked far in advance. Tin plate shipments are not keeping pace with production, but output is based entirely upon releases. Sheet production is off five points to 65 per cent, and strip mill schedules have suffered a similar contraction to 50 per cent.

THE automobile industry has begun to place orders for its May requirements which are expected to be somewhat smaller than its April needs. Nevertheless, heavy second quarter schedules by General Motors may offset the probable decline in Ford's output, and it is believed that the motor makers will experience another million-car quarter in the next three months. Reduction of stocks may be a factor in limiting steel requirements during the period.

While the recent dust storms in the West have checked demand for tractors and farm implements, manufacturers' forward commitments are so heavy that production schedules can be maintained for many weeks. Although implement makers expected an increase in demand this year, actual orders have been four times as large as their most optimistic estimates. An acute shortage of skilled labor has developed in certain implement manufacturing centers.

Makers of electrical refrigerators, washing machinery and a number of kinds of household equipment have already indicated that their second quarter activity will be as great as in the first three months of the year. Other miscellaneous steel users who make consumer goods are taking material regularly but on a strictly requirement basis.

THE construction industry continues to be dormant. It is believed that public works expenditures promised by the expected $4,880,000,000 appropriation will not be felt in the steel industry for at least six months. This week's structural steel awards of 17,600 tons include 10,000 tons for the new continuous strip mill of the Bethlehem Steel Co. at Lackawanna, N. Y., and compare with 45,800 tons in the previous week. Last week's awards, however, were swelled by a 33,000-ton contract for the Triborough bridge at New York.

It is significant that new structural projects announced during the week call for only 2600 tons of steel, the smallest total since early in April, 1933. New fabricated plate inquiries at 14,000 tons include 10,000 tons for the Grand Coulee Dam penstocks.

Rail purchases include 25,000 tons by the Chicago & North Western and 5000 tons by the Chicago Great Western. The Van Sweringen railroads will purchase rails eventually, but inquiry is being delayed for several weeks. The Chicago, Burlington & Quincy has ordered a fourth stainless steel passenger train.

UNFAVORABLE Washington developments include a report that the Wagner labor disputes bill now before Congress will be given Administration support in return for certain unnamed concessions made by organized labor. The steel industry is unalterably opposed to this legislation, which is now being suggested as a substitute for the famous Section 7-a of the recovery act.

The NRA research and planning division is making a study of pig iron importations from the Netherlands and British India which will be followed by recommendations to the President. Confusion over the recently announced reciprocal trade agreement with Belgium has been intensified by financial difficulties in that country which may lead to currency devaluation. If this happens, the agreement will have to be revised and decreases in duties on steel imported from Belgium may be postponed indefinitely. Great Britain has increased the import duties on semi-finished steel and a large number of finished steel products from 33⅓ per cent to as much as 50 per cent.

Steel scrap prices continue to be weak, and THE IRON AGE composite price has declined from $10.83 to $10.75 a ton, the lowest level of the year. The finished steel and pig iron composites are unchanged at $17.90 a ton and 2.124c. a lb. respectively.

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron

Per Gross Ton:	Mar. 26, 1935	Mar. 19, 1935	Feb. 26, 1935	Mar. 27, 1934
No. 2 fdy., Philadelphia	$20.26	$20.26	$20.26	$19.26
No. 2, Valley furnace	18.50	18.50	18.50	17.50
No. 2 Southern, Cin'ti	19.13	19.13	19.13	18.13
No. 2, Birmingham†	14.50	14.50	14.50	13.50
No. 2 foundry, Chicago*	18.50	18.50	18.50	17.50
Basic, del'd eastern Pa.	19.76	19.76	19.76	18.76
Basic, Valley furnace	18.00	18.00	18.00	17.00
Valley Bessemer, del'd P'gh	20.76	20.76	20.76	19.76
Malleable, Chicago*	18.50	18.50	18.50	17.50
Malleable, Valley	18.50	18.50	18.50	17.50
L. S. charcoal, Chicago	24.04	24.04	24.04	23.54
Ferromanganese, seab'd carlots	85.00	85.00	85.00	85.00

†This quotation is for delivery in South; in the North prices are 38c. a ton under delivered quotations from nearest Northern furnace.

*The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Rails, Billets, etc.

Per Gross Ton:				
Rails, heavy, at mill	$36.37½	$36.37½	$36.37½	$36.37½
Light rails, Pittsburgh	35.00	35.00	35.00	32.00
Rerolling billets, Pittsburgh	27.00	27.00	27.00	26.00
Sheet bars, Pittsburgh	28.00	28.00	28.00	26.00
Slabs, Pittsburgh	27.00	27.00	27.00	26.00
Forging billets, Pittsburgh	32.00	32.00	32.00	31.00
Wire rods, Pittsburgh	38.00	38.00	38.00	36.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb	1.70	1.70	1.70	1.60

Finished Steel

Per Lb.:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.80	1.80	1.80	1.75
Bars, Chicago	1.85	1.85	1.85	1.80
Bars, Cleveland	1.85	1.85	1.85	1.80
Bars, New York	2.13	2.13	2.13	2.08
Plates, Pittsburgh	1.80	1.80	1.80	1.70
Plates, Chicago	1.85	1.85	1.85	1.75
Plates, New York	2.08	2.08	2.08	1.98
Structural shapes, Pittsburgh	1.80	1.80	1.80	1.70
Structural shapes, Chicago	1.85	1.85	1.85	1.75
Structural shapes, New York	2.05¼	2.05¼	2.05¼	1.95¼
Cold-finished bars, Pittsburgh	2.10	2.10	2.10	2.10
Hot-rolled strips, Pittsburgh	1.85	1.85	1.85	1.75
Cold-rolled strips, Pittsburgh	2.60	2.60	2.60	2.40

Finished Steel

Per Lb.:	Mar. 26, 1935 Cents	Mar. 19, 1935 Cents	Feb. 26, 1935 Cents	Mar. 27, 1934 Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.40	2.40	2.40	2.25
Hot-rolled annealed sheets, No. 24, Gary	2.50	2.50	2.50	2.35
Sheets, galv., No. 24, P'gh	3.10	3.10	3.10	2.85
Sheets, galv., No. 24, Gary	3.20	3.20	3.20	2.95
Hot-rolled sheets, No. 10, P'gh	1.85	1.85	1.85	1.75
Hot-rolled sheets, No. 10, Gary	1.95	1.95	1.95	1.85
Wire nails, Pittsburgh	2.60	2.60	2.60	2.35
Wire nails, Chicago dist. mill	2.65	2.65	2.65	2.40
Plain wire, Pittsburgh	2.30	2.30	2.30	2.20
Plain wire, Chicago dist. mill	2.35	2.35	2.35	2.25
Barbed wire, galv., P'gh	3.00	3.00	3.00	2.85
Barbed wire, galv., Chicago dist. mill	3.05	3.05	3.05	2.90
Tin plate, 100 lb. box, P'gh	$5.25	$5.25	$5.25	$5.25

Scrap

Per Gross Ton:				
Heavy melting steel, P'gh	$11.75	$12.00	$12.75	$14.25
Heavy melting steel, Phila	10.25	10.25	11.50	11.75
Heavy melting steel, Ch'go	10.25	10.25	10.75	12.00
Carwheels, Chicago	10.50	11.00	12.00	11.75
Carwheels, Philadelphia	11.75	11.75	12.50	13.00
No. 1 cast, Pittsburgh	12.25	12.75	13.25	13.75
No. 1 cast, Philadelphia	11.00	11.00	11.00	13.25
No. 1 cast, Ch'go (net ton)	9.00	9.50	10.00	9.50
No. 1 RR. wrot., Phila	10.75	10.75	11.00	11.00
No. 1 RR. wrot., Ch'go (net)	8.00	8.00	8.75	9.50

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	$3.85	$3.85	$3.85	$3.50
Foundry coke, prompt	4.60	4.60	4.60	4.25

Metals

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Electrolytic copper, refinery‡	8.75	8.75	8.75	7.75
Lake copper, New York‡	9.12½	9.12½	9.12½	8.00
Tin (Straits), New York	47.45	45.50	47.87½	54.45
Zinc, East St. Louis	3.90	3.90	3.75	4.32½
Zinc, New York	4.25	4.25	4.10	4.67½
Lead, St. Louis	3.45	3.45	3.40	3.90
Lead, New York	3.60	3.60	3.55	4.00
Antimony (Asiatic), N. Y.	14.50	14.50	14.50	7.60

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables. ‡Blue Eagle copper.

The Iron Age Composite Prices

	Finished Steel	Pig Iron	Steel Scrap
March 26, 1935	2.124c. a Lb.	$17.90 a Gross Ton	$10.75 a Gross Ton
One week ago	2.124c.	17.90	10.83
One month ago	2.124c.	17.90	11.67
One year ago	2.008c.	16.90	12.67
	Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strips. These products make 85 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel High	Finished Steel Low	Pig Iron High	Pig Iron Low	Steel Scrap High	Steel Scrap Low
1935	2.124c., Jan. 8;	2.124c., Jan. 8	$17.90, Jan. 8;	$17.90, Jan. 8	$12.33, Jan. 8;	$10.75, Mar. 26
1934	2.199c., April 24;	2.008c., Jan. 2	17.90, May 1;	16.90, Jan. 27	13.00, Mar. 13;	9.50, Sept. 25
1933	2.015c., Oct. 3;	1.867c., April 18	16.90, Dec. 5;	13.56, Jan. 3	12.25, Aug. 8;	6.75, Jan. 3
1932	1.977c., Oct. 4;	1.926c., Feb. 2	14.81, Jan. 5;	13.56, Dec. 6	8.50, Jan. 12;	6.42, July 5
1931	2.037c., Jan. 13;	1.945c., Dec. 29	15.90, Jan. 6;	14.79, Dec. 15	11.33, Jan. 6;	8.50, Dec. 29
1930	2.273c., Jan. 7;	2.018c., Dec. 9	18.21, Jan. 7;	15.90, Dec. 16	15.00, Feb. 18;	11.25, Dec. 9
1929	2.317c., April 2;	2.273c., Oct. 29	18.71, May 14;	18.21, Dec. 17	17.58, Jan. 29;	14.08, Dec. 3
1928	2.286c., Dec. 11;	2.217c., July 17	18.59, Nov. 27;	17.04, July 24	16.50, Dec. 31;	13.08, July 2
1927	2.402c., Jan. 4;	2.212c., Nov. 1	19.71, Jan. 4;	17.54, Nov. 1	15.25, Jan. 11;	13.08, Nov. 22

Steel Production Sustained In Pittsburgh and Valleys

Tin Plate Output Rises to 90 Per Cent of Capacity—Sheet and Strip Demand Slightly Less Active — Scrap Prices Decline

PITTSBURGH, March 26.—Bookings of finished steel are in reduced volume as the first quarter's end approaches. Few mills in the Pittsburgh district have built up backlogs that will support current operations much beyond the middle of April. The trend in miscellaneous steel demand is mixed, but no drastic shrinkage in orders is reported. There is discernible among consumers, however, a growing caution to cover ahead in the face of several influences that may shape the early course of steel activity.

The most imminent contingency is the proposed bituminous mine suspension on April 1. Although that possibility has not noticeably aroused undue anxiety either among steel producers or consumers, it nevertheless is momentarily entering into plans for production schedules for the next month. Stocks of fuel in consumers' hands are believed generally to be sufficient to cover requirements for the next 30 to 60 days.

Steel producers in the Pittsburgh area still expect further important buying by the automotive industry. Until such business materializes, however, sheet and strip mill schedules are headed downward and will face serious revisions late in April unless substantial new bookings are made. In the current week sheet mill operations are five points lower at 65 per cent, while strip output will suffer a similar loss to about 50 per cent.

The most encouraging feature in the present steel market is the record production rate for tin plate. Operations are at 90 per cent this week, and no immediate decline is in sight.

Demand for heavy hot-rolled steel products lacks feature but hope for broad improvement later on this year has been engendered by talk of allocating a large part of the Federal relief money now being appropriated for the primary purpose of speeding up the capital goods industries. The usual spring road construction programs are lagging this year because local governments are awaiting disposition of the Federal relief bill before launching work supported by State or local funds.

Steel ingot production in the Pittsburgh district is sustained this week at 35 per cent of capacity. No change in output is reported in the valleys and nearby northern Ohio mills, which are engaged at about 55 per cent. Heavy tin plate production and substantial shipments of light flat-rolled steel are sustaining ingot output in the Wheeling district at 85 per cent.

Scrap has weakened further, with heavy melting steel off 25c. a ton at Pittsburgh.

Pig Iron

Foundry requirements in this district are not tending upward, nor are large non-integrated mills openly interested in basic or Bessemer irons. Second quarter buying has not gotten under way, and there are no influences that augur any unusual coverage for that period. The Neville Island stack resumed operations on March 20.

Semi-Finished Steel

Shipments of sheet bars to detached tin plate mills have been accelerated in line with heavier tin plate production. Practically all of such deliveries are going directly into consumption, and stocks are not being augmented at the present time. Non-integrated sheet and strip mills are tapering their demands for sheet bars, slabs and billets. Skelp is fairly active. Calls for forging stock are irregular.

Bolts, Nuts and Rivets

There has been no noticeable pickup in releases on first quarter contracts in anticipation of the higher prices to become generally effective on April 1. Incoming tonnage has remained virtually unchanged for the past three weeks.

Rails and Track Accessories

Although the season is becoming more favorable to track work, tonnage of rails and accessories reaching this district is extremely limited. A great deal of new track to be laid will be furnished from stocks of rails shipped last year, and only minor purchases are in the early outlook until earnings improve and until pending legislation seriously affecting the carriers is settled.

Reinforcing Steel

Although a great deal of prospective work that hinges entirely upon the securing of Federal funds is in the offing, the immediate market is bare of encouraging features. The greatest barrier to the launching of spring road construction programs is the unsettled state of the large Federal relief bill, which local governments are awaiting before allocating funds out of State, county or municipal coffers. Extensive flood control plans for this district still are indefinite. Meanwhile reinforcing producers are existing on small releases against prior commitments. Private work is nil.

Cold-Finished Bars

A slump in automotive specifications became general last week, but was offset partly by a well-sustained flow of miscellaneous tonnage. Farm implement makers are paring their specifications slightly, having evidently gotten their production ahead of demand in certain agricultural areas, which are to some extent partly unsettled by certain conditions not favorable to crop prospects. Jobbers are slow to specify except for fill-in lots.

Plates and Shapes

The acquisition of land on the Monongahela River by the American Oil Co. may lead to an inquiry for six to nine steel tank barges, which would require about 1200 to 1800 tons of plates and shapes. It is reported that the company also plans to build oil storage tanks on the newly acquired land, in which event a fair tonnage of tank plates would be required. A considerable amount of barge repair work along the rivers is under way, but the bulk of such work is restricted to sand blasting and painting, with steel requirements at a minimum. General tank and railroad construction work has not expanded.

Both inquiries and awards for structural steel diminished in the past week. No important awards reached mills in the Pittsburgh district. The new list of inquiries reported here comprise, with one exception, State highway bridge construction.

Tubular Products

Although spring improvement has not appeared, bookings of

most grades of pipe, excepting line pipe, are in unusually steady volume. Some producers report a slightly heavier business in oil-country goods, which are expected to improve further as conditions permit greater drilling. Bookings of locomotive boiler tubes are temporarily heavier in view of the usual blanket quarterly steel contracts placed by the carriers at this time. Only occasional orders are being received for boiler tubes for industrial plant repair work.

Bars

Shipments to the motor car centers have not been accelerated since the slump in automotive demand several weeks ago. Producers still are sanguine that automotive orders will improve markedly within a fortnight. The most encouraging aspect of this market is the sustained interest displayed by miscellaneous consumers. In few instances, however, are bar requirements being covered for extended shipment.

Wire Products

Seasonal trends in demand for wire products have not yet appeared. Interest from the farm regions is disappointing, while the hardware lines, including nails and screenings, are relatively depressed. Prospects for merchant wire trade are leaning heavily on what proportion of the pending Federal spending will be allocated to home building. Wire output at most mills in this district is unchanged, with a leading producer operating well above the average for stocking purposes.

Sheets

General specifications received here in the past week reflected a slight further contraction in consumer demand. Recession in automotive buying was most noticeable. Sheet mill operations are tapering in line with reduced consumer takings, and this week probably will average five points lower at 65 per cent. After the first quarter shipping deadline on March 31, mill backlogs will be much leaner, but a more drastic slump is expected after mid-April, when most mills will have fulfilled current forward commitments. New tonnage is not coming in at a rate sufficient to offset the downtrend now in progress.

Tin Plate

Continued heavy contract releases have put further life into this market, and tin plate production for the industry has advanced five points to about 90 per cent of capacity. It is questionable whether output has exceeded at any time the present heavy rate. Backlogs reported by important producers are considered ample to take care of present schedules for two to three weeks. Most current releases are being placed by canners in anticipation of fruit and vegetable packs for the coming season.

Strip Steel

The approach of second quarter is greatly relaxing pressure upon mills for deliveries, even for certain automotive items. In most instances, backlogs will be seriously reduced on April 1, unless an unforeseen flow of heavy business appears. It is considered likely that deliveries to the automotive industry will increase with expanding production at three large motor car plants. Production continues to decline with this week's output five points lower at about 50 per cent.

Coke and Coal

Although fuel producers in western Pennsylvania are generally agreed that a suspension in bituminous coal production will be forced on April 1 by the soft coal union, consumers, on the other hand, are not covering ahead so freely as in the past several months. The belief is that consumers have contracted for their forward requirements to the limit of fairly definite business prospects. Supplies on consumers' yards generally average 30 to 90 days ahead. Part of the shrinkage in activity is ascribable to a normal decline in shipments of domestic fuel.

Scrap

Further weakness is evident, with No. 1 heavy melting steel 25c. a ton lower. Brokers are offering freely to sell No. 1 steel at $12, delivered to consumers. There still is some resistance on the part of small yard dealers to release scrap at below $11.75, but such supplies are becoming increasingly available in the absence of any large movement of scrap to mills in this district. Consumers are not displaying any interest in scrap commitments, and the trend in demand probably will not be clear until after April 1, when mills will know more definitely about future operating schedules and also the possible effect of the bituminous coal mine suspension which appears slated for that date.

Slight Improvement In St. Louis Demand

ST. LOUIS, March 26.—A pick-up is reported in the trade for finished iron and steel, although the increased volume is not heavy. Wire products are moving more freely, but the demand is mostly for barbed wire rather than fencing. Galvanized roofing also is in greater demand. Warehouse business in March has been equal to February on a day-to-day basis, but will be ahead of last month because of the additional working days. Warehouse demand is coming mostly from the rural sections, especially from the South.

Superior Structural Steel Co. has been awarded 300 tons of shapes for a refinery at Woodriver, Ill., for Shell Petroleum Corpn. The Kansas City Structural Steel Co. has taken 600 tons of plates for a syphon at Paxton, Neb.

The sale of a few thousand tons of specialties to two East Side steel mills constituted the business in scrap iron last week. The market continues weak, and some items are lower, including selected heavy steel and No. 2 heavy melting.

Shipments of pig iron are being well maintained. New business consists mainly of small orders, with the total volume fairly large. Stove foundries in the district are busy on gas ranges.

Buffalo Production Rate Unchanged

BUFFALO, March 26.—Two more blast furnaces are scheduled to be blown in in this district within another month or six weeks. The Hanna Furnace Corpn. is preparing a stack for service and it is reported that the Tonawanda Iron Corpn. will likewise light its unit in the late spring.

Eight open-hearth furnaces are in operation at the Lackawanna plant of the Bethlehem Steel Co. and three at Republic Steel Corpn. Wickwire-Spencer is operating one and the Seneca sheet division of Bethlehem is operating at 80 per cent.

The McClintic-Marshall Corpn. will fabricate some 10,000 tons of structural steel for the new Bethlehem continuous strip mill. Approximately 1500 tons of reinforcing bars will likewise be required.

The pig iron business has not improved and March commitments were below February's.

The largest consumer in the district is reported to have purchased 20,000 tons of No. 1 and No. 2 heavy melting steel in the past 60 days, principally in Detroit and Duluth. The No. 1 steel is reported to have been bought in considerable quantities at a price which averages under $10.50. This concern has now retired from the market and is awaiting the opening of navigation and water shipments from Detroit.

Steel Demand Fairly Well Sustained in Chicago Area

Ingot Production Off Only Half a Point as Finished Steel Shipments to Automobile, Tractor and Farm Implement Makers Show No Abatement

CHICAGO, March 26.—The steel business in this area is holding up much better than sentiment. The boiling political pot at Washington, the dust-storms in the prairie States and new uncertainties regarding the basing point system and the permanence of the price provisions in the steel code have all served to accentuate caution among buyers.

Orders are being placed at such short range that mills are unable to make an accurate forecast of operations from one week to the next. Yet aggregate bookings are showing surprisingly little recession. New business in finished steel is the largest for any week with the exception of two since the first of the year. The specifications of one producer are the biggest to date this year but were swelled by rail releases.

The Chicago & Northwestern has ordered 25,000 tons of rails, of which 18,000 tons went to the Illinois Steel Co. and 7000 tons to the Inland Steel Co. Orders for 9000 tons of accessories were divided among 10 companies. The Chicago Great Western has bought 5000 tons of rails.

Steel ingot output in this district has declined only a half point to 47 per cent of capacity. Blast furnace operations remain at a good level, with 15 steel works' stacks active out of a total of 36.

Demand from the automobile, tractor and farm implement industries shows little abatement. Tin plate is moving at a high rate. Jobber demand for steel pipe, though still far below pre-depression levels, has improved materially. Wire mills continue to operate at 50 per cent of capacity.

In anticipation of a possible coal strike April 1, iron and steel producers, as well as consumer industries, have accumulated substantial stocks, equal in most cases to requirements for 30 days or longer. Largely on account of the uncertain outlook, scrap has given further ground.

Pig Iron

Pig iron shipments are running 5 per cent ahead of February. Melt by automobile foundries is expected to recede in late April or early May, but tractor and implement plants, according to present indications, will consume more iron in the second quarter than in the first. Foundry coke shipments this month will top those of February by 15 per cent. About 10 per cent of the gain is attributable to increased foundry melt and the remainder to stocking in anticipation of a coal strike. Only a few large users have stocked any coke as it does not lend itself to storage. Coke producers have coal supplies for several months ahead and hence the movement to foundries is in no danger of interruption. One merchant blast furnace is active in this district.

Plates

Two awards, one for an elevated water tank and the other for Government scows, account for a total of 1100 tons. Railroad equipment and repair programs are slow in materializing. Mississippi River dam projects are the only large jobs in the offing.

Structural Steel

Interest is focused on the Alton, Ill., and Fort Peck, Mont., dam tonnages on which bids will be taken April 3 and April 11 respectively. Current awards, made up of small projects, total 2200 tons. New inquiry is light. Public projects under the new five-billion dollar appropriation are not expected to reach the bidding stage until next fall or winter.

Bars

Bars are moving in almost undiminished volume to the automobile, tractor and farm implement industries. Increasing operations by Chevrolet are bolstering consumption by the automotive trade. Recent dust storms are said to have checked demand for tractors, trucks and farm machinery, but manufacturers already had such heavy forward commitments that a decline in new business is almost welcome. Producers in this field expected an increase in demand this year, but their actual bookings have been four times as large as their most optimistic estimates. An acute shortage of skilled labor has developed in certain districts specializing in tractor and implement manufacture. Barn equipment makers are inquiring for more steel, thereby indicating that they too are expanding their operations. Reinforcing bar awards total 2500 tons, and a large aggregate tonnage is pending.

Sheets

Sheet producers in this district are hard pressed to meet the demands of the trade. One interest is booked through April and well into May. The automotive industry is still the outstanding source of tonnage.

Wire Products

Demand is still heavy enough in the aggregate to engage wire mills at close to 50 per cent of capacity. Automotive business remains good, and there is a fair demand from miscellaneous industries. Dust storms have not affected agricultural demand. Business from the farm regions is in encouraging volume, although far below pre-depression levels. Utilities are buying sparingly. There is little interest in wire cable.

Cast Iron Pipe

Chicago has divided 2100 tons of 6 to 16-in. between two pipe makers. Considerable small PWA work is pending, but contractors are delaying the purchase of the pipe needed until they are sure of settled weather conditions.

Reinforcing Bars

More private work is being placed. Current awards include 550 tons for a local malting company and 475 tons for a Chicago department store. Among pending jobs is 600 tons for a local rug plant. General contract bids have been taken on the Milwaukee sewage filter plant, requiring 3500 tons.

Rails

The Chicago & Northwestern has ordered 25,000 tons of rails of which 18,000 tons went to the Illinois Steel Co., and 7000 to the Inland Steel Co. Nine thousand tons of accessories were divided among 10 companies. The Chicago Great Western has bought 4000 tons of rails from the Illinois Steel

(CONCLUDED ON PAGE 68)

Finished Steel Demand Is Lighter in New York Area

Tin Plate Is Most Active Product, With Noticeable Falling Off in Calls for Sheets, Strip and Bars—Pig Iron Very Dull

NEW YORK, March 26.—Increasing demand for tin plate is about the only bright spot in this market. Many mills are now booked at near capacity on this product for a month or more, and the peak in activity is not believed to have been reached. The larger can companies predict that 1935 will be a much better year than its predecessor. An interesting feature of current tin plate demand is the heavy call for cold-reduced material. The industry's available capacity for this type of plate has been engaged at close to 100 per cent over the entire year to date.

Following the placing of the structural steel for the main span of the Tri-borough bridge last week, the market for heavy material is rather quiet. However, the two contracts for the smaller spans of this structure are expected to come out in a month or so and will require about 20,000 tons. No private building activity of importance is appearing in this district.

The railroads are doing a moderate amount of miscellaneous buying, but sizable purchases are lacking. A fair tonnage will be required for 29 subway cars recently awarded to the J. G. Brill Co. for the high-speed line over the Delaware River Bridge, at Philadelphia. The Chicago, Burlington & Quincy has placed a fourth four-car articulated stainless steel train with the Edward G. Budd Mfg. Co., Philadelphia.

The steel industry on the Atlantic seaboard is watching with interest financial developments in Belgium. If that country leaves the gold standard it is probable that the reciprocal trade agreement between the United States and Belgium will have to be considerably revised, as the proposed treaty calls for action in case of any important fluctuation in currency exchange.

Pig Iron

General foundry business is in about the same volume as a month ago. Even though deliveries on old contracts are going forward steadily, most buyers continue to restrict new ordering to nearby requirements. Total bookings last week amounted to about 1650 tons, compared with 1100 tons in the previous period and 2000 tons booked a fortnight ago.

Reinforcing Steel

Miscellaneous small-lot demands for bars and mesh continue at a fairly satisfactory level. Nearly all of the large active tonnages have been placed, however, and the absence of new projects indicates slack business for distributers over the next few months.

Cast Iron Pipe

Less-than-carlot business is in fair volume, and a number of tonnage projects are pending. About 5000 tons for the PWA and the City of New York will be released as soon as additional appropriations are available. The Warren Foundry & Pipe Corpn. will furnish 750 tons of 6 to 20-in. pipe for installation at Rockaway Beach, N. Y. The most recent new project calls for 200 tons of 10-in. and smaller pipe for Greenwood Lake, N. J., on which tenders are due April 8.

Scrap

Leading brokers continue to offer $9 to $7.50 a ton for No. 1 and No. 2 steel, respectively, alongside barge. However, the flow of material from small dealers has fallen off somewhat. This dealer attitude is probably occasioned by the war scare in Europe and the belief that eastern Pennsylvania mills may be forced to buy in the near future. Local brokers are finding it impossible to interest domestic mills in new commitments. Foreign buyers are just as anxious as ever to place new orders, but are not inclined to meet the price levels set by most brokers. Export shipments from this port are currently not of the volume of several months ago, largely as the result of reduced accumulations and the inability to secure a sufficient number of boats.

Steel Sales Sustained In Cincinnati Area

CINCINNATI, March 26.—The steady weakness of scrap, combined with mill fears of a fuel strike, is depressing the local old materials market. Some steel mill scrap is moving on old orders, but blast furnace material is without interest. Yard supplies are fairly intact, except for depletion to fill old commitments, but dealers are not prone to lay down any more material on a speculative basis. Prices generally are soft in the absence of demand. Mills generally are reported to be carrying fair inventories of scrap as the result of attractive purchases last year on distress material.

The activity of district steel mills is unabated as demand last week equaled the preceding seven-day period. This current business, however, is on a slightly lower level than during the first two and a half months of the quarter. Backlogs, built up during the flurry, are sustaining current operations at between 80 to 85 per cent of capacity output. Automotive demand has eased somewhat and accounts for the decline in mill bookings. Other demand, however, is well sustained and the market is in a sensitive position toward any increase in bookings from non-automotive users. New business is all for immediate shipment.

Orders for pig iron are not large, but the market total fluctuates around 800 tons a week. Of this, about 200 tons in small lots, is Southern iron. Lack of price incentive is largely responsible for failure of melters to anticipate needs. Both Northern and Southern furnaces are adhering to current schedules. Jobbing foundries are restricting operations, in some instances to a few heats a month, but automobile, specialty and stove foundries are in moderate activity.

Fear of labor difficulties in fuel areas has stimulated foundry coke shipments and the index level so far this month is higher than at any time this quarter. Oven representatives indicate that reserves are sufficient to supply customers until the situation would affect other manufacturing materials.

Philadelphia Consumers Still Buying Sparingly

Operating Schedules of District Mills Average 33 Per Cent—Sheet Buying Passes Peak—Scrap Trend Is Uncertain

PHILADELPHIA, March 26.—Local warehouses are purchasing various grades of steels in small quantities to keep their stocks at a workable level. In addition, about 5000 tons of automobile sheets is being placed each week by district autobody stamping plants. Otherwise this district still suffers from the buying inertia which has been conspicuous since the turn of the year. Miscellaneous consumers view the agitation for revision of codes as a factor which may result in lower prices but are entirely unlikely to cause advances. Consequently the current practice of spot buying to cover minimum essential requirements is a logical reaction.

The disappearance of forward purchasing, however, is of minor significance as compared with the discouraging aspect of steel outlets for the forthcoming months. Private and public construction is at a standstill, and it is improbable that important highway tonnages will appear in any volume before late in the second quarter. District mills look for no railroad purchasing of any size in the near future, and local shipyards have little in prospect for the summer months.

District mills are melting steel in volume practically unchanged from a week ago, or at 33 per cent of potential capacity. Pencoyd continues to melt in four furnaces and is still operating its 28-in. structural mill. Several of the small mills are stocking ingots, and it is entirely likely that furnaces at these plants may shut down temporarily in the near future.

Some 15 jobbers of pipe and tubing located in this area have been penalized by the steel code authority for violating their jobbers' agreements. Until they are reinstated, mills can sell these jobbers only on a card and 5 per cent basis.

The J. G. Brill Co. has been awarded 26 electric passenger cars by the Delaware River Joint Commission for service on the Camden-Philadelphia line. The Edward G. Budd Mfg. Co. will build a fourth stainless steel train for the Burlington railroad.

Pig Iron

With good cupola scrap available at less than $11 a ton, most district foundries are charging 75 to 90 per cent scrap, as compared with the 100 per cent pig iron practice of several years ago. Likewise, district steel mills find it more economical to use machinery cast in preference to pig iron. The general business decline of the past month is now reflected in poorer iron sales, although contract deliveries are holding at a satisfactory level. The Swedeland furnace is going into blast, not on the strength of a better outlook for iron sales but because of the pressure of burdensome coke stocks. It is unlikely that any eastern independent furnace will blow in during the summer months.

Sheets and Strip

Auto body production has declined slightly from the peak level of a month ago. Local stamping plants are fabricating about 12,000 tons of sheets each week, but most of this material represents deliveries on early first quarter contracts. Three weeks' delivery is possible on narrow cold-rolled sheets whereas wide sheets can be delivered in five to six weeks. Strip demand is currently very light.

Bars, Plates and Shapes

Award of the varied requirements for the Erie ferry boat is expected during the next week. An elevated tank at Shoemakersville, Pa., requiring 100 tons of plates, has been let to Chicago Bridge & Iron Works. No new plate business of any moment has appeared in this market. Likewise, the market for structural steel continues almost inactive. Lehigh Structural Steel Co. will supply 300 tons for towers for the Pennsylvania Power & Light Co., and the one new project of the week calls for 150 tons for a Passaic County, N. J., bridge, on which bids close April 8. About 650 tons of reinforcing bars for Philadelphia Navy Yard buildings has been awarded to Concrete Steel Co.

Imports

The following iron and steel imports were received here last week: 102 tons of steel tubes, 34 tons of steel wire, 27 tons of steel forgings and 23 tons of steel bars from Sweden; 63 tons of pig iron from Norway; 19 tons of steel bars and 3 tons of structural shapes from Belgium, and 18 tons of chrome ore from British South Africa.

Scrap

Bethlehem continues to pay $10 directly to dealers for No. 1 steel at district mills. However, there is no indication that nearby mills could obtain a tonnage from brokers at much under $10.50. Lukens is still holding up shipments, and there have been no new domestic tonnages placed. The steady export outlet is preventing the accumulation of distress lots of heavy steels. Phoenixville is paying $8.50 for stove plate and No. 2 steel, and cast continues to move to Harrisburg at $10 to $10.50. Heavy low phosphorus scrap has been marked down 25c. on the basis of several sales late last week in the $14.50 to $15 range. The flow of export steel to Port Richmond continues unabated, and the accumulations of steel on cars at that port are still quite large as a result of the inability to secure a sufficient number of Japanese boats.

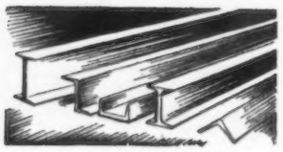
February Pig Iron Imports Higher

WASHINGTON, March 26.—February imports of iron and steel products into the United States aggregated 28,905 gross tons, an increase of 26.8 per cent over the January total and 13.7 per cent over the movement in February, 1934, according to the Commerce Department's Iron and Steel Division.

A 7992-ton increase in pig iron receipts was more than sufficient to turn the trend upward, and marked the resumption of Netherlands participation in this trade after an absence of several months. The 1684-ton decline in structural shape imports was a further feature of the February trade.

Details of the February import trade will appear in THE IRON AGE next week.

Steel Production Again Declines at Cleveland



Output Now At 54 Per Cent of Capacity Because of Curtailment At Lorain — May Automotive Buying Gets Underway

CLEVELAND, March 26.—For the third consecutive week ingot output in the Cleveland-Lorain territory has dropped, now being at 54 per cent of capacity. This decline of four points was due to the taking off of two open-hearth furnaces at Lorain. A blast furnace also has been shut down at Lorain, leaving two in operation.

New demand continues to taper slightly. Some of the automobile companies are starting to place sheets for May production but their early purchases are expected to be smaller than those made for the months of the first quarter and for April. Refrigerator, washing machine, tub and stove manufacturers continue to order liberally and are hopeful of good operations through the second quarter.

Some manufacturers of forgings and other automobile parts have been building up stocks of parts in excess of the current requirements of their customers and are slowing down operations. Miscellaneous consumers are restricting purchases to small lots for immediate needs and are insisting on quick deliveries.

Demand for steel from the railroads and for construction work is slight and limited almost wholly to public projects. Aside from projects now under way, little new public work is in prospect until fresh Federal funds are made available. While the usual time of rail purchases has passed, the Van Sweringen railroads are delaying any possible buying for 1935 and rail inquiries from this source are not expected for several weeks.

Scrap prices have again declined, now being fully 50c. to $1 a ton below the February peak.

Pig Iron

Shipping orders have gained slightly from consumers who still have some iron due on first quarter contracts. Shipments this month will be slightly more than in February. New business has declined. There has been little contracting for the second quarter and new demand from the motor car foundries has fallen off. While some jobbing foundries that specialize on certain classes of work have become busier recently, the improvement is not general.

Bars, Plates, and Shapes

Activity in the construction field is confined largely to work in connection with the Muskingum Watershed Conservancy District project. Bids have been taken or are being asked for covering several portions of this work requiring 1000 tons or more of reinforcing steel. An award against bids taken for the relocation of the Pennsylvania Railroad tracks in connection with this project, requiring 1500 tons of rails, will be made shortly, and bids for the relocation of the Baltimore & Ohio tracks, requiring an unstated quantity of rails, will be taken May 7. Demand for steel bars has declined, due largely to a falling off in orders from manufacturers of automobile parts.

Sheets

New demand is not holding up to recent volume. Some of the automobile manufacturers are now figuring on sheets for May delivery and new business continues to come from this source for April shipment, but not in as large lots as recently. As there may be reductions in production schedules by some automobile manufacturers during May, consumers are not worried over securing deliveries and a rush in placing of orders for May is not expected. Some business in enameling sheets has been placed by stove manufacturers for May shipment. Electrical refrigerator and washing machine tub manufacturers expect that their present good production schedules will be maintained through the second quarter. Finishing mills are having no difficulty in producing all the sheets ordered for the current quarter. Some consumers specified more sheets than they needed for March and are canceling a portion of their tonnage and re-entering new orders for April shipment.

Strip Steel

Some new business was placed during the week by automobile parts manufacturers, but in smaller lots than they have been ordering recently. Mills are getting caught up on outstanding orders and operations are being curtailed. Orders from consumers outside of the automotive field are very light.

Scrap

Prices have further declined, steel making scrap being marked down 50c. a ton and blast furnace grades 25c. a ton. There is no new demand and fresh purchases by the steel plants are not looked for before April 15. Mills have good stocks and dealers are well cleaned up on outstanding contracts. Shipments to the Youngstown district are still being restricted.

New England Foundry Iron Stocks Small

BOSTON, March 26.—The first quarter ends with New England foundry pig iron stocks generally the lightest within the memory of furnace representatives, and with operators showing no disposition to buy beyond immediate small requirements. However, more small pig iron orders were booked in the past week than in any similar period of the quarter and gave the market a somewhat more active appearance. Aggregate sales, however, were comparatively small. The outlook for castings is possibly a little more hopeful, particularly in Connecticut.

Largely because of recent price reductions and the unwillingness of holders to sell on current quotations, and partly because exporters are now experiencing trouble in securing steamers, business in scrap has dropped to small proportions in the export market and has come to a standstill so far as Pennsylvania deliveries are concerned. Local market prices have failed to follow a further cut in Pittsburgh for the reason that brokers have no orders to fill. A steamer has just cleared here with 6000 tons of scrap for Ardrossan, Scotland, and Swansea, Wales. Providence, R. I., interests expect to load 2500 tons around the middle of April.

The Boston & Maine locomotive repair shops at Billerica, Mass., and passenger car repair shops of Concord, N. H., have been closed until April 1, at least.

Output and Demand Holding In South

BIRMINGHAM, March 26.—The iron and steel markets are moving along slowly. Jobbers and consumers are buying only in limited amounts and for early requirements. Although books for the second quarter have been open since March 1, only routine volume has been booked to date.

March pig iron shipments will be slightly larger than those of February, but not enough to stiffen the market. Foundries persist in holding their commitments within narrow limits. The base price remains at $14.50.

Current buying of steel products is spotty. There is a gradual flow of orders from jobbers for sheets and wire products, most of which are for small amounts. Structural and plate buying is dependent on current projects, which are now irregular.

Railroad tonnage was, and still is, chiefly responsible for the current rate of blast furnace and open-hearth operations. Nine blast furnaces have been producing since March 1. Actual open-hearths have totaled 12 during the past two weeks and the number will not be changed this week.

Pacific Coast Mills Reducing Inventories

SAN FRANCISCO, March 25.—A lessening of scrap movement has resulted from the tendency of mills to restrict purchases from dealers and to confine buying to contracted tonnages. However, this move is not thought to mean a decrease in mill production but rather to an effort to reduce inventories. A slight drop in scrap prices is not unlikely, although an increase in Japanese purchases may take up the surplus.

Efforts of the Federal Government to avert a general ship tie-up on the West Coast may bring conciliation between striking oil tanker crews and operators. Thoughts of a repetition of last summer's labor difficulties, with the heavy financial losses, are not heartening to business. Although Secretary of Labor Perkins is on the Coast at this time quite by coincidence, her influence may possibly be utilized.

Steel bookings during the past week were for minor tonnages. Truscon Steel Co. took 519 tons of reinforcing bars for two school jobs in Los Angeles. Awards aggregated only 956 tons of reinforcing bars and 503 tons of structural steel.

From the Northwest it is reported that the Bureau of Reclamation will take bids within the next 90 days on 18 ft. penstocks for Grand Coulee dam which is being constructed near Almira, Wash. Preliminary estimates call for approximately 10,000 tons of plates. Specifications for the Mad River dam and pipe line, to be located near Eureka, Cal., call for 1300 to 1600 tons of plates, 289 tons of reinforcing bars and more than 100 tons of structural steel. Date for bids will be set shortly.

Activity on the Pacific Coast at the present time seems to be led by the reconstruction program in southern California although major tonnages are included in future work on the Colorado River aqueduct, Grand Coulee and Fort Peck dams and other Federal projects.

31% increase in Production

•

Nearly 100% increase in Die Life

•

88% reduction in Scrap . . .

•

The above are actual records secured from a recent installation, where Chambersburg Model J Board Hammers replaced a battery of obsolete hammers, with an immediate increase in efficiency—of which the above figures represent merely the high spots. Details will be furnished gladly.

A copy of Bulletin 252 will suggest the reasons for these remarkable figures. Write for it today.

CHAMBERSBURG
MODEL J
BOARD DROP HAMMER
CHAMBERSBURG ENGINEERING CO., CHAMBERSBURG, PA.

Prices of Finished Steel and Iron Products

BARS, PLATES, SHAPES

Iron and Steel Bars

	Soft Steel Base per Lb.
F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
F.o.b. Gary	1.85c.
F.o.b. Duluth	1.95c.
Del'd Detroit	1.95c.
F.o.b. Cleveland	1.85c.
F.o.b. Buffalo	1.90c.
Del'd Philadelphia	2.09c.
Del'd New York	2.13c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.20c.
F.o.b. cars dock Pacific ports	2.35c.

Rail Steel
(For merchant trade)

F.o.b. Pittsburgh	1.70c.
F.o.b. Chicago	1.75c.
F.o.b. Gary	1.75c.
F.o.b. Moline, Ill.	1.75c.
F.o.b. Cleveland	1.75c.
F.o.b. Buffalo	1.80c.
F.o.b. Birmingham	1.85c.
F.o.b. cars dock Gulf ports	2.10c.
F.o.b. cars dock Pacific ports	2.25c.

Billet Steel Reinforcing
(Straight lengths as quoted by distributers)

F.o.b. Pittsburgh	2.05c.
F.o.b. Chicago	2.10c.
F.o.b. Gary	2.10c.
Del'd Detroit	2.20c.
F.o.b. Cleveland	2.10c.
F.o.b. Youngstown	2.10c.
F.o.b. Buffalo	2.10c.
F.o.b. Birmingham	2.10c.
F.o.b. cars dock Gulf ports	2.45c.
F.o.b. cars dock Pacific ports	2.45c.

Rail Steel Reinforcing
(Straight lengths as quoted by distributers)

F.o.b. Pittsburgh	1.90c.
F.o.b. Chicago	1.95c.
F.o.b. Gary	1.95c.
F.o.b. Cleveland	1.95c.
F.o.b. Youngstown	1.95c.
F.o.b. Buffalo	1.95c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.30c.
F.o.b. cars dock Pacific ports	2.30c.

Iron

F.o.b. Chicago	1.80c.
F.o.b. Terre Haute, Ind.	1.75c.
F.o.b. Louisville, Ky.	2.10c.
F.o.b. Danville, Pa.	1.80c.
F.o.b. Berwick, Pa.	1.70c.

Cold Finished Bars and Shafting*

	Base per Lb.
F.o.b. Pittsburgh	2.10c.
F.o.b. Chicago	2.15c.
F.o.b. Gary	2.15c.
F.o.b. Cleveland	2.15c.
F.o.b. Buffalo	2.20c.
Del'd Detroit	2.30c.
Del'd eastern Michigan	2.35c.

* In quantities of 10,000 to 19,000 lb.

Fence and Sign Posts

Angle Line Posts	Base per Net Ton
F.o.b. Pittsburgh	$50.00
F.o.b. Chicago	50.00
F.o.b. Duluth	51.00
F.o.b. Cleveland	50.00
F.o.b. Birmingham	53.00
F.o.b. Houston, Orange, Beaumont, Galveston	59.00
F.o.b. Mobile	58.00
F.o.b. New Orleans, Lake Charles, Corpus Christi	59.00
F.o.b. cars dock Pacific ports	63.00

Plates

	Base per Lb.
F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
F.o.b. Gary	1.85c.
Del'd Cleveland	1.985c.
F.o.b. Coatesville	1.90c.
F.o.b. Sparrows Point	1.90c.
Del'd Philadelphia	1.985c.
Del'd New York	2.08c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.20c.
F.o.b. cars dock Pacific ports	2.35c.
Wrought iron plates, f.o.b. P'gh	3.20c.

Floor Plates

F.o.b. Pittsburgh	3.35c.
F.o.b. Chicago	3.40c.
F.o.b. Coatesville	3.45c.
F.o.b. cars dock Gulf ports	3.75c.
F.o.b. cars dock Pacific ports	3.90c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
Del'd Cleveland	1.985c.
F.o.b. Buffalo	1.90c.
F.o.b. Bethlehem	1.90c.
Del'd Philadelphia	2.005c.
Del'd New York	2.0525c.
F.o.b. Birmingham (standard)	1.95c.
F.o.b. cars dock Gulf ports	2.20c.
F.o.b. cars dock Pacific ports	2.35c.

Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh	2.15c.
F.o.b. Chicago	2.25c.
F.o.b. Buffalo	2.25c.
F.o.b. cars dock Gulf ports	2.60c.
F.o.b. cars dock Pacific ports	2.60c.

SHEETS, STRIP, TIN PLATE TERNE PLATE

Sheets

Hot Rolled

	Base per Lb.
No. 10, f.o.b. Pittsburgh	1.85c.
No. 10, f.o.b. Gary	1.95c.
No. 10, del'd Detroit	2.05c.
No. 10, del'd Phila.	2.14c.
No. 10, f.o.b. Birmingham	2.00c.
No. 10, f.o.b. dock cars Pacific ports	2.40c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.40c.
No. 24, f.o.b. Gary	2.50c.
No. 24, del'd Detroit	2.60c.
No. 24, del'd Phila.	2.69c.
No. 24, f.o.b. Birmingham	2.55c.
No. 24, f.o.b. dock cars Pacific ports	3.05c.
No. 24, wrought iron, Pittsburgh	4.30c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	2.50c.
No. 10 gage, f.o.b. Gary	2.60c.
No. 10 gage, del'd Detroit	2.70c.
No. 10 gage, del'd Phila.	2.79c.
No. 10 gage, f.o.b. Birmingham	2.65c.
No. 10 gage, f.o.b. dock cars Pacific ports	3.10c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh	2.95c.
No. 20 gage, f.o.b. Gary	3.05c.
No. 20 gage, del'd Detroit	3.15c.
No. 20 gage, del'd Phila.	3.24c.
No. 20 gage, f.o.b. Birmingham	3.10c.
No. 20 gage, f.o.b. dock cars Pacific ports	3.50c.

Galvanized Sheets

No. 24, f.o.b. Pittsburgh	3.10c.
No. 24, f.o.b. Gary	3.20c.
No. 24, del'd Phila.	3.39c.
No. 24, f.o.b. Birmingham	3.25c.
No. 24 f.o.b. dock cars Pacific ports	3.70c.
No. 24, wrought iron, Pittsburgh	4.95c.

Long Ternes

No. 24, unassorted 8-lb. coating f.o.b. Pittsburgh	3.40c.
F.o.b. cars dock Pacific ports	4.10c.

Vitreous Enameling Stock

No. 20, f.o.b. Pittsburgh	3.10c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.75c.
No. 28, Gary	2.85c.
No. 28, cars dock, Pacific Coast ports	3.35c.

Tin Plate

	Per Base Box
Standard cokes, f.o.b. P'gh district mill	$5.25
Standard cokes, f.o.b. Gary	5.35
Standard cokes, f.o.b. cars dock Pacific ports	5.90

Terne Plate
(F.o.b. Pittsburgh)
(Per Package, 20 x 28 in.)

8-lb. coating I.C.	$10.00
15-lb. coating I.C.	12.00
20-lb. coating I.C.	13.00
25-lb. coating I.C.	14.00
30-lb. coating I.C.	15.25
40-lb. coating I.C.	17.50

Hot-Rolled Hoops, Bands, Strips and Flats under ¼ In.

	Base per Lb.
All widths up to 24 in., P'gh	1.85c.
All widths up to 24 in., Chicago	1.95c.
All widths up to 24 in., del'd Detroit	2.05c.
All widths up to 24 in., Birmingham	2.00c.
Cooperage stock, Pittsburgh	2.10c.
Cooperage stock, Chicago	2.20c.

Cold-Rolled Strips

	Base per Lb.
F.o.b. Pittsburgh	2.60c.
F.o.b. Cleveland	2.60c.
Del'd Chicago	2.88c.
F.o.b. Worcester	2.80c.

Fender Stock

No. 14, Pittsburgh or Cleveland	2.90c.
No. 14, Worcester	3.30c.
No. 20, Pittsburgh or Cleveland	3.30c.
No. 20, Worcester	3.70c.

Hot-Rolled Rail Steel Strips

	Base per Lb.
F.o.b. Pittsburgh	1.70c.
F.o.b. Chicago	1.75c.
F.o.b. Birmingham	1.85c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

To Manufacturing Trade	Per Lb.
Bright wire	2.30c.
Spring wire	2.90c.

Chicago prices on products sold to the manufacturing trade are $1 a ton above Pittsburgh or Cleveland. Worcester and Duluth prices are $2 a ton above, Birmingham $3 above, and Pacific Coast prices $9 a ton above Pittsburgh or Cleveland.

To Jobbing Trade

Qualified jobbers are entitled to a reduction of 20c. a 100 lb. from the base price on carload shipments to stock, and of 10c. a 100 lb. on less-carload shipments to stock.

	Base per Keg
Standard wire nails	$2.60
Smooth coated nails	2.60
Galvanized nails:	
15 gage and coarser	4.60
16 gage and finer	5.10

	Base per 100 Lb.
Annealed fence wire	$2.45
Galvanized fence wire	2.80
Polished staples	3.30
Galvanized staples	3.55
Barbed wire, galvanized	3.00
Woven wire fence, base column	63.00

Chicago and Anderson, Ind., mill prices are $1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is $2 above Pittsburgh); Duluth, Minn., and Worcester, Mass., mill prices are $2 a ton over Pittsburgh (except for woven wire fence at Duluth which is $3 over Pittsburgh), and Birmingham mill prices are $3 a ton over Pittsburgh.

On wire nails, barbed wire, staples and fence wire, prices at Houston, Galveston and Corpus Christi, Tex., New Orleans, Lake Charles, La., and Mobile, Ala., are $6 a ton over Pittsburgh, while Pacific Coast prices are $8 over Pittsburgh. Exception: on fence wire Pacific Coast prices are $11 a ton above Pittsburgh.

On staples and barbed wire, prices of $6 a ton above Pittsburgh are also quoted at Beaumont and Orange, Tex.

Wire Hoops, Twisted or Welded

	Off List
F.o.b. Pittsburgh	35 and 2½ off
F.o.b. Chicago	35 off

STEEL AND WROUGHT PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

F.o.b. Pittsburgh only on wrought iron pipe.

Butt Weld

Steel Inches	Black	Galv.	Wrought Iron Inches	Black	Galv.
⅛	51½	29½	⅛	+91½	+138
¼ to ⅜	53½	35	¼ & ⅜	+11½	+21½
½	58½	47	½	+31½	15
¾	62	52	¾	36½	20½
1 to 3	64	55	1 & 1¼	39½	25½
			1½	43½	28
			2	41½	26

Lap Weld

2	60	51	2	37	22½
2½ to 3	63	54	2½ to 3½	38	25
3½ to 6	65	56	4 to 8	40	28½
7 and 8	64	54	9 to 12	38	24½
9 and 10	63½	53½			
11 and 12	62½	52½			

Butt Weld, extra strong, plain ends

⅛	48½	33½	⅛	+13	+45½
¼ to ⅜	51	38	¼ & ⅜	+2½	+24½
½	56½	47½	½	32½	17½
¾	61	52	¾	37½	22½
1 to 3	63	55	1 to 2	43½	29

Lap Weld, extra strong, plain ends

2	58	50	2	40	26
2½ to 3	62	54	2½ to 4	45½	33
3½ to 6	65½	57½	4½ to 6	45	33½
7 and 8	64½	54½	7 & 8	46	33
9 and 10	63½	53½	9 to 12	41½	30
11 and 12	62½	52½			

On standard steel pipe an extra 5% off is allowed on sales to consumers while two 5's off apply on sales to jobbers. On less-than-carload shipments prices are determined by adding 20 and 25% and the carload freight rate to the base card. On structural steel pipe the base card is reduced 2 points and two 5's off are allowed to consumers and three 5's off to jobbers.

Note—Chicago district mills have a base two points less than the above discounts Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Seamless Steel Commercial Boiler Tubes and Locomotive Tubes

(Net base prices per 100 ft, f.o.b. Pittsburgh, in carload lots)

		Cold Drawn	Hot Rolled
1 in. o.d.	13 B.W.G.	$ 8.60	$7.23
1¼ in. o.d.	13 B.W.G.	10.19	9.36
1½ in. o.d.	13 B.W.G.	11.36	10.23
1¾ in. o.d.	13 B.W.G.	12.81	11.84
2 in. o.d.	13 B.W.G.	14.35	13.94
2¼ in. o.d.	13 B.W.G.	16.00	14.84
2½ in. o.d.	12 B.W.G.	19.29	17.34
2¾ in. o.d.	12 B.W.G.	20.45	18.38
3 in. o.d.	12 B.W.G.	21.45	19.50
4½ in. o.d.	10 B.W.G.	41.08	37.36
3½ in. o.d.	11 B.W.G.	27.09	24.73
4 in. o.d.	10 B.W.G.	33.60	30.54
4½ in. o.d.	10B.W.G.	41.08	37.36
5 in. o.d.	9 B.W.G.	51.56	46.87
6 in. o.d.	7 B.W.G.	79.15	71.94

Extras for less-carload quantities:
25,000 lb. or ft. to 39,999 lb. or ft. 5 %
10,000 lb. or ft. to 24,999 lb. or ft. 12½ %
2,000 lb. or ft. to 9,999 lb. or ft. 25 %
Under 2,000 lb. or ft. 40 %

Hot-Finished Lapweld Steel Pressure Tubes

(Net base prices per 100 ft., f.o.b. Pittsburgh, in carload lots)

1⅛ in o.d.	13 B.W.G.	$ 9.73
1¾ in. o.d.	13 B.W.G.	11.66
2 in. o.d.	13 B.W.G.	12.38
2¼ in. o.d.	13 B.W.G.	13.18
2½ in. o.d.	12 B.W.G.	16.58
2¾ in. o.d.	12 B.W.G.	17.54
3 in. o.d.	12 B.W.G.	18.35
3¼ in. o.d.	11 B.W.G.	21.58
3½ in. o.d.	11 B.W.G.	23.15
4 in. o.d.	10 B.W.G.	28.66
4½ in. o.d.	10 B.W.G.	35.23
5 in. o.d.	9 B.W.G.	44.25
6 in. o.d.	7 B.W.G.	68.14

Quantity Extras:
40,000 lb. or ft. base
25,000 lb. or ft. to 39,999 lb. or ft. plus 5%
10,000 lb. or ft. to 24,999 lb. or ft. plus 12½%
2,000 lb. or ft. to 9,999 lb. or ft. plus 25 %
Under 2,000 lb. or ft. plus 40 %

CHARCOAL IRON BOILER TUBES

Base Discounts, f.o.b. Pittsburgh

In. O. D.	
1½ and 1¾	44
2 —2¼	13 and 10
2½—2¾	16 and 10
3	17 and 10
3¼—3½	18 and 10
4	20 and 10
4½, 5, 6	21 and 10

Extras for quantity: For 1½ to 1¾, up 8 points under 10,000 lb., up 4 points 10,000 lb. to carload. For 2 in. to 5½ in., up 2 points without supplementary 10 per cent, under 10,000 lb.; supplementary 5 per cent instead of supplementary 10 per cent for 10,000 lb. to carload.

In sizes 2 in. to 4½ in. O.D. inclusive, all tubes more than four gages heavier than standard are priced per lb. as follows: Carload and over, 9c.; extras for quantity—under 10,000 lb. 1c. per lb., 10,000 lb. to carload ½c. per lb.

CAST IRON WATER PIPE

	Per Net Ton
*6-in. and larger, del'd Chicago	$47.00
*4-in., del'd Chicago	50.00
6-in. and larger, del'd New York	45.00
4-in. del'd New York	48.00
*6-in. and larger, Birmingham	39.00
*4-in. Birmingham	42.00

Class "A" and gas pipe, $3 extra.
*Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $38, Birmingham, and $46, delivered Chicago, and 4-in pipe $41, Birmingham, and $49 a ton, delivered Chicago.

RAILROAD MATERIALS

Rails and Track Supplies

F.o.b. Mill

Standard rails, heavier than 60 lb., per gross ton	$36.37½
Angle bars, per 100 lb.	2.55

F.o.b. Code Basing Points

Light rails (from billets) per gross ton	$35.00
Light rails (from rail steel) per gross ton	34.00

	Base per 100 Lb.
Spikes, 9/16 in. and larger	$2.40
Spikes, ½ in. and smaller	2.40
Spikes, boat and barge	2.40
Tie plates, steel	1.90
Tie plates, Pacific Coast ports	2.00
Track bolts, to steam railroads	3.55
Track bolts, no jobbers, all sizes (per 100 count)	70 per cent off list

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Buffalo, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa.; on spikes alone, Cleveland, Youngstown, Lebanon, Pa., Columbia, Pa., Richmond, Va., Jersey City, N. J.

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Per Cent Off List

Machine bolts .....70, 10 and 5
Carriage bolts .....70, 10 and 5
Lag bolts .....70, 10 and 5
Plow bolts, Nos. 1, 2, 3 and 7 heads .....70, 10 and 5
Hot-pressed nuts, blank or tapped, square .....70, 10 and 5
Hot-pressed nuts, blank or tapped, hexagons .....70, 10 and 5
C.p.c. and t. square or hex. nuts, blank or tapped .....70, 10 and 5
Semi-finished hexagon nuts, U.S.S. all sizes .....70, 10 and 5
Semi-finished hexagon nuts, S.A.E. ¼ in. to 7/16 in. diameter..70, 10 and 5
½ in. to 1 in. diameter....70, 10 and 5
larger than 1 in. diameter..70, 10 and 5
Stove bolts in packages, Pittsburgh.. 75
Stove bolts in packages, Chicago..... 75
Stove bolts in packages, Cleveland.... 75
Stove bolts in bulk, P'gh. 83
Stove bolts in bulk, Chicago..... 83
Stove bolts in bulk, Cleveland..... 83
Tire bolts .....60 and 5

Large Rivets

(½-in. and larger)

Base per 100 Lb.

F.a.b. Pittsburgh or Cleveland.....$2.90
F.a.b. Chicago 3.00
F.a.b. Birmingham 3.05

Small Rivets

(7/16-in. and smaller)

Per Cent Off List

F.a.b. Pittsburgh .....70 and 5
F.a.b. Cleveland .....70 and 5
F.a.b. Chicago and Birm'g'm....70 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 65c per 100 lb. on lots of 200 lb. or more)

Per Cent Off List

Milled cap screws, 1 in. dia. and smaller .....80, 10 and 10
Milled standard set screws, case hardened, 1 in. dia. and smaller.....75
Milled headless set screws, cut thread ¾ in. and smaller 75
Upset hex. head cap screws, U.S.S.S. or S.A.E. thread, 1 in. dia. and smaller 85
Upset set screws, cut and oval point 75 and 10 to 80
Milled studs .....65 to 65 and 10

Alloy and Stainless Steel

Alloy Steel Ingots

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.
Uncropped .....$40 per gross ton

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.
Base price, $49 a gross ton.

Alloy Steel Bars

Price del'd Detroit is $52.

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.
Open-hearth grade, base.....2.45c.
Delivered price at Detroit is.....2.60c.

S.A.E. Series Numbers		Alloy Differential per 100 lb.
2000	(1¼% Nickel)	$0.25
2100	(2¼% Nickel)	0.55
2300	(3½% Nickel)	1.50
2500	(5% Nickel)	2.25
3100	Nickel Chromium	0.55
3200	Nickel Chromium	1.35
3300	Nickel Chromium	3.80
3400	Nickel Chromium	3.20
4100	Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4130	Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600	Nickel Molybdenum (0.20 to 0.30 Molybdenum) (1.50 to 2.00 Nickel)	1.05
5100	Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100	Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100	Chromium Spring Steel....	base
6100	Chromium Vanadium Bar.	1.20
6100	Chromium Vanadium Spring Steel	0.70
	Chromium Nickel Vanadium	1.50
	Carbon Vanadium	0.95

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. The differential for cold-drawn bars is ¼c. per lb. higher with separate extras. Blooms, billets and slabs under 4x4 in. or equivalent are sold on the bar base. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base. Sections 4x4 in. to 10x10 in. or equivalent carry a gross ton price, which is the net price for bars for the same analysis. Larger sizes carry extras.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 2.95c. base per lb.

STAINLESS STEEL No. 302

(17 to 19% Cr. 7 to 9% Ni. 0.08 to 0.20% C.)

(Base Prices, f.o.b. Pittsburgh)

Per Lb.

Forging billets .....19.55c.
Rerolling slabs ..... 15c.
Bars ..... 23c.
Plates ..... 28c.
Structural shapes ..... 23c.
Sheets ..... 33c.
Hot-rolled strip .....20¾c.
Cold-rolled strip ..... 27c.
Drawn wire ..... 23c.

Raw and Semi-Finished Steel

Carbon Steel Rerolling Ingots

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham.
Uncropped .....$29 per gross ton

Carbon Steel Forging Ingots

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Birmingham.
Uncropped .....$31 per gross ton

Billets, Blooms and Slabs

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham.

Per Gross Ton

Rerolling $27.00
Forging quality 32.00

Delivered Detroit

Rerolling $30.00
Forging 35.00

Billets Only F.o.b. Duluth

Rerolling $29.00
Forging 34.00

Sheet Bars

F.o.b. Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

Per Gross Ton

Open-hearth or Bessemer $28.00

Skelp

F.o.b. Pittsburgh, Chicago, Youngstown, Buffalo, Coatesville, Pa., Sparrows Point, Md.

Per Lb.

Grooved ..... 1.70c.
Universal ..... 1.70c.
Sheared ..... 1.70c.

Tube Rounds

Base per Lb.

F.o.b. Pittsburgh ..... 1.80c.
F.o.b. Chicago ..... 1.85c.
F.o.b. Cleveland ..... 1.85c.
F.o.b. Buffalo ..... 1.90c.
F.o.b. Birmingham ..... 1.95c.

Wire Rods

(Common, base)

Per Gross Ton

F.o.b. Pittsburgh $38.00
F.o.b. Cleveland 38.00
F.o.b. Chicago 39.00
F.o.b. Anderson, Ind. 39.00
F.o.b. Youngstown 39.00
F.o.b. Worcester, Mass. 40.00
F.o.b. Birmingham 41.00
F.o.b. San Francisco 47.00
F.o.b. Galveston 44.00

Pig Iron and Ferroalloys

PIG IRON

PRICES PER GROSS TON AT BASING POINTS

Basing Points	No. 2 Fdry.	Malleable	Basic	Bessemer
Everett, Mass.	$19.50	$20.00	$19.00	$20.50
Bethlehem, Pa.	19.50	20.00	19.00	20.50
Birdsboro, Pa.	19.50	20.00	19.00	20.50
Swedeland, Pa.	19.50	20.00	19.00	20.50
Steelton, Pa.	....	....	19.00	....
Sparrows Point, Md.	19.50	....	19.00	....
Neville Island, Pa.	18.50	18.50	18.00	19.00
Sharpsville, Pa.	18.50	18.50	18.00	19.00
Youngstown	18.50	18.50	18.00	19.00
Buffalo	18.50	19.00	17.50	19.50
Erie, Pa.	18.50	19.00	18.00	19.50
Cleveland	18.50	18.50	18.00	19.00
Toledo, Ohio	18.50	18.50	18.00	19.00
Jackson, Ohio	20.25	20.25	19.75	....
Detroit	18.50	18.50	18.00	19.00
Hamilton, Ohio	18.50	18.50	18.00	19.00
Chicago	18.50	18.50	18.00	19.00
Granite City, Ill.	18.50	18.50	18.00	....
Duluth, Minn.	19.00	19.00	....	19.50
Birmingham	14.50	14.50	13.50	19.00
Provo, Utah	17.50	....	17.00	....

DELIVERED PRICES PER GROSS TON AT CONSUMING CENTERS

	No. 2 Fdry.	Malleable	Basic	Bessemer
Boston Switching District From Everett, Mass.	$20.00	$20.50	$19.50	$21.00
Brooklyn From East. Pa. or Buffalo	21.77	22.27	21.27	22.77
Newark or Jersey City, N. J. From East. Pa. or Buffalo	20.89	21.39	20.39	21.89
Philadelphia From Eastern Pa.	20.26	20.76	19.76	21.26
Cincinnati From Hamilton, Ohio	19.51	19.51	19.01	20.01
Canton, Ohio From Cleveland and Youngstown	19.76	19.76	19.26	20.26
Columbus, Ohio From Hamilton, Ohio	20.50	20.50	....	....
Mansfield, Ohio From Cleveland and Toledo	20.26	20.26	....	....
Indianapolis From Hamilton, Ohio	20.77	20.77	....	....
South Bend, Ind. From Chicago	20.55	20.55	....	....
Milwaukee From Chicago	19.50	19.50	....	....
St. Paul From Duluth	20.94	....	....	....
Davenport, Iowa From Chicago	20.26	20.26	....	....
Kansas City From Granite City	21.04	21.04	....	....

Delivered prices on Southern iron for shipment to Northern points are 38c. a gross ton below delivered prices from the nearest Northern basing points.

LOW PHOSPHORUS PIG IRON

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y. $23.50

GRAY FORGE PIG IRON

Valley furnace $18.00
Pittsburgh district furnace 18.00

CHARCOAL PIG IRON

Lake Superior furnace $21.00
Delivered Chicago 24.04
Delivered Buffalo 24.28

CANADA

Pig Iron

Per gross ton:

Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75.....$21.00
No. 2 fdy., sil. 1.75 to 2.75..... 20.50
Malleable 21.00

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75.....$22.50
No. 2 fdy., sil. 1.75 to 2.25..... 22.00
Malleable 22.50
Basic 22.00

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload) $85.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21% $26.00

Electric Ferrosilicon

Per Gross Ton Delivered

50% (carloads) $77.50
50% (ton lots) 85.00
75% (carloads) 126.00
75% (ton lots) 136.00

Silvery Iron

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton		*Per Gross Ton*	
6%	$22.75	12%	$29.25
7%	23.75	13%	30.75
8%	24.75	14%	32.25
9%	25.75	15%	33.75
10%	26.75	16%	35.25
11%	27.75	17%	36.75

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Bessemer Ferrosilicon

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton		*Per Gross Ton*	
10%	$27.75	14%	$33.25
11%	28.75	15%	34.75
12%	30.25	16%	36.25
13%	31.75	17%	37.75

Manganese 1½ to 3%, $1 a ton additional. For each unit of manganese over 3%, $1 a ton additional. Phosphorus 0.75% or over, $1 ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Other Ferroalloys

Ferrotungsten, per lb. contained W, del., carloads .....$1.35 to $1.45
Ferrotungsten, less carloads,. 1.45 to 1.55
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr. per lb. contained Cr. delivered, in carloads ..... 10.00c.
Ferrochromium, 2% carbon .....16.50c. to 17.00c.
Ferrochromium, 1% carbon .....17.50c. to 18.00c.
Ferrochromium, 0.10% carbon .....19.50c. to 20.00c.
Ferrochromium, 0.06% carbon .....20.00c. to 20.50c.
Ferrovanadium, del., per lb. contained V .....$2.70 to $2.90
Ferrocarbontitanium, 15 to 18% Ti, 6 to 8% C, f.o.b. furnace carload and contract per net ton.$137.50
Ferrophosphorus, electric, or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton with $2 unitage..... 50.00
Ferrophosphorus, electric, 24% f.o.b. Anniston, Ala., per gross ton with $2.75 unitage 65.00
Ferromolybdenum, per lb. Mo., del. 95c.
Calcium molybdate, per lb. Mo., del. ..... 80c.
Silico spiegel, per ton, f.o.b. furnace, car lots $38.00
Ton lots or less per ton 45.50
Silico-manganese, gross ton, delivered:
2.50% carbon grade 90.00
2% carbon grade 95.00
1% carbon grade 105.00
Spot prices .....$5 a ton higher

Iron and Steel Scrap

PITTSBURGH

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$11.50 to $12.00
No. 2 heavy melting steel	10.50 to 11.00
No. 2 railroad wrought	11.50 to 12.00
Scrap rails	12.25 to 12.75
Rails, 3 ft. and under	13.25 to 13.75
Compressed sheet steel	11.50 to 12.00
Hand bundled sheet steel	10.25 to 10.75
Hvy. steel axle turnings	10.00 to 10.50
Machine shop turnings	7.00 to 7.50
Short shov. turnings	7.00 to 7.50
Short mixed borings and turnings	6.00 to 6.50
Cast iron borings	6.00 to 6.50
Cast iron carwheels	12.25 to 12.75
Heavy breakable cast	11.00 to 11.50
No. 1 cast	12.00 to 12.50
Railr. knuckles and couplers	14.00 to 14.50
Rail. coil and leaf springs	14.00 to 14.50
Rolled steel wheels	14.00 to 14.50
Low phos. billet crops	14.50 to 15.00
Low phos. sheet bar crops	14.50 to 15.00
Low phos. plate scrap	14.00 to 14.50
Low phos. punchings	14.00 to 14.50
Steel car axles	14.50 to 15.00

CHICAGO

Delivered Chicago district consumers:

	Per Gross Ton
Heavy melting steel	$10.00 to $10.50
Automobile hvy. melt. steel	9.50 to 10.00
Shoveling steel	10.00 to 10.50
Hydraulic comp. sheets	9.00 to 9.50
Drop forge flashings	8.50 to 9.00
No. 1 busheling	8.25 to 8.75
Rolled carwheels	11.00 to 11.50
Railroad tires	12.00 to 12.50
Railroad leaf springs	11.00 to 11.50
Axle turnings	9.00 to 9.50
Steel couplers and knuckles	11.00 to 11.50
Coil springs	12.00 to 12.50
Axle turnings (elec. fur.)	10.00 to 10.50
Low phos. punchings	12.00 to 12.50
Low phos. plates, 12 in. and under	12.50 to 13.00
Cast iron borings	5.50 to 6.00
Short shoveling turnings	5.50 to 6.00
Machine shop turnings	5.00 to 5.50
Rerolling rails	11.50 to 12.00
Steel rails, less than 3 ft.	12.00 to 12.50
Steel rails, less than 2 ft.	12.50 to 13.00
Angle bars, steel	11.25 to 11.75
Cast iron carwheels	10.50 to 11.00
Railroad malleable	13.00 to 13.50
Agricultural malleable	9.50 to 10.00

	Per Net Ton
Iron car axles	$13.50 to $14.00
Steel car axles	13.50 to 14.00
No. 1 railroad wrought	8.00 to 8.50
No. 2 railroad wrought	8.75 to 9.25
No. 2 busheling	4.50 to 5.00
Locomotive tires, smooth	10.00 to 10.50
Pipe and flues	5.00 to 5.50
No. 1 machinery cast	9.00 to 9.50
Clean automobile cast	8.50 to 9.00
No. 1 railroad cast	8.00 to 8.50
No. 1 agricultural cast	8.00 to 8.50
Stove plate	5.50 to 6.00
Grate bars	5.50 to 6.00
Brake shoes	6.00 to 6.50

PHILADELPHIA

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$10.00 to $10.50
No. 2 heavy melting steel	8.50 to 9.00
No. 1 railroad wrought	10.50 to 11.00
Bundled sheets	9.50 to 10.00
Hydraulic compressed, new	10.00 to 10.50
Hydraulic compressed, old	7.00 to 7.50
Machine shop turnings	6.00 to 6.50
Heavy axle turnings	8.50 to 9.00
Cast borings	5.00 to 5.50
Stove plate (steel works)	8.25 to 8.50
Heavy breakable cast	10.00 to 10.50
No. 1 low phos. heavy	14.50 to 15.00
Couplers and knuckles	13.50 to 14.00
Rolled steel wheels	13.50 to 14.00
No. 1 blast furnace	5.00 to 5.50
Spec. iron and steel pipe	8.00 to 8.50
Shafting	17.00 to 17.50
Steel axles	16.50 to 17.00
No. 1 forge fire	9.50 to 10.00
Cast iron carwheels	11.50 to 12.00
No. 1 cast	11.00
Cast borings (chem.)	12.00 to 14.00
Steel rails for rolling	12.00 to 12.50

CINCINNATI

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$7.75 to $8.25
No. 2 heavy melting steel	6.25 to 6.75
Scrap rails for melting	7.75 to 8.25
Loose sheet clippings	4.25 to 4.75
Bundled sheets	5.75 to 6.25
Cast iron borings	4.25 to 4.75
Machine shop turnings	4.25 to 4.75
No. 1 busheling	5.75 to 6.25
No. 2 busheling	2.50 to 3.00
Rails for rolling	8.75 to 9.25
No. 1 locomotive tires	7.00 to 7.50
Short rails	11.25 to 11.75
Cast iron carwheels	7.75 to 8.25
No. 1 machinery cast	9.00 to 9.50
No. 1 railroad cast	8.25 to 8.75
Burnt cast	5.75 to 6.25
Stove plate	5.75 to 6.25
Agricultural malleable	7.75 to 8.25
Railroad malleable	8.75 to 9.25

CLEVELAND

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$9.75 to $10.25
No. 2 heavy melting steel	9.25 to 9.50
Compressed sheet steel	9.00 to 9.50
Light bundled sheet stampings	7.00 to 7.50
Drop forge flashings	8.50 to 9.00
Machine shop turnings	6.00 to 6.50
Short shoveling turnings	6.75 to 7.25
No. 1 busheling	9.00 to 9.50
Steel axle turnings	9.00 to 9.50
Low phos. billet crops	14.50 to 15.00
Cast iron borings	6.75 to 7.25
Mixed borings and short turnings	6.75 to 7.25
No. 2 busheling	6.75 to 7.25
No. 1 cast	12.00 to 12.50
Railroad grate bars	7.00 to 7.50
Stove plate	8.00 to 8.50
Rails under 3 ft.	14.50 to 15.00
Rails for rolling	15.50 to 18.00
Railroad malleable	13.00 to 13.50
Cast iron carwheels	12.00

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:

No. 1 heavy melting steel	$10.25 to $10.75
No. 2 heavy melting scrap	8.75 to 9.25
Scrap rails	11.00 to 11.50
New hydraul. comp. sheets	8.75 to 9.25
Old hydraul. comp. sheets	7.75 to 8.25
Drop forge flashings	8.75 to 9.25
No. 1 busheling	8.75 to 9.25
Hvy. steel axle turnings	8.00 to 8.50
Machine shop turnings	4.50 to 5.00
Knuckles and couplers	11.50 to 12.00
Coil and leaf springs	11.50 to 12.00
Rolled steel wheels	11.50 to 12.00
Low phos. billet crops	12.00 to 12.50
Short shov. steel turnings	5.50 to 6.00
Short mixed borings and turnings	5.50 to 6.00
Cast iron borings	5.50 to 6.00
No. 2 busheling	6.50 to 7.00
Steel car axles	11.50 to 12.00
Iron axles	11.50 to 12.00
No. 1 machinery cast	11.00 to 11.50
No. 1 cupola cast	10.00 to 10.50
Stove plate	9.00 to 9.50
Steel rails, 3 ft. and under	12.50 to 13.00
Cast iron carwheels	11.00 to 11.50
Industrial malleable	12.00 to 13.00
Railroad malleable	12.00 to 13.00
Chemical borings	8.00 to 8.50

BOSTON

Dealers' buying prices per gross ton:

*No. 1 heavy melting steel	$8.25 to $8.50
No. 1 heavy melting steel	6.25 to 6.50
*Scrap T rails	8.50
*No. 2 steel	7.00 to 7.25
No. 2 steel	5.50 to 5.75
Breakable cast	5.75 to 6.00
Machine shop turnings	2.00 to 2.25
Bundled skeleton, long	5.00 to 5.25
Forge flashings	5.00 to 5.25
Mixed borings and turnings	1.00 to 1.50
Shafting	12.00 to 12.50
Steel car axles	11.50 to 12.00
Cast iron borings, chemical	6.50 to 7.00
Stove plate	4.00 to 4.25

Per gross ton delivered consumers' yards:

Textile cast	$9.00 to $9.50
No. 1 machinery cast	9.00 to 9.50
Stove plate	6.00 to 6.50
Railroad malleable	11.00 to 11.50

* Delivered local army base.

NEW YORK

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	*$8.00 to †$9.00
No. 2 heavy melting steel	*7.00 to †7.50
Heavy breakable cast	6.00 to 6.25
No. 1 machinery cast	7.50 to 8.00
No. 2 cast	6.50 to 7.00
Stove plate	6.00 to 6.50
Steel car axles	13.50 to 14.00
No. 1 railroad wrought	7.00 to 7.50
No. 1 yard wrought, long	6.00 to 6.50
Spec. iron and steel pipe	4.50 to 5.00
Forge fire	5.50 to 6.00
Rails for rolling	9.00 to 9.50
Short shoveling turnings	2.50 to 3.00
Machine shop turnings	2.50 to 3.00
Cast borings	3.50 to 3.75
No. 1 blast furnace	2.00 to 2.50
Cast borings (chemical)	11.00 to 11.50
Unprepared yard iron and steel	4.50 to 5.00

Per gross ton, delivered local foundries:

No. 1 machinery cast	$10.50
No. 1 hvy. cast (cupola size)	9.50
No. 2 cast	8.00

*For direct car loading only.
†Loading on barge.

BIRMINGHAM

Per gross ton delivered consumers' yards:

Heavy melting steel	$9.00 to $9.50
Scrap steel rails	10.00 to 10.50
Short shoveling turnings	7.00
Stove plates	7.00
Steel axles	11.50
Iron axles	11.50
No. 1 railroad wrought	7.00
Rails for rolling	12.50
No. 1 cast	9.50 to 10.00
Tramcar wheels	10.00

ST. LOUIS

Per gross ton delivered consumers' yards:

Selected heavy steel	$8.50 to $9.00
No. 1 heavy melting	8.00 to 8.50
No. 2 heavy melting	7.00 to 7.50
No. 1 locomotive tires	9.75 to 10.25
Misc. stand-sec. rails	9.25 to 9.50
Railroad springs	10.50 to 11.00
Bundled sheets	6.00 to 6.50
No. 2 railroad wrought	8.00 to 8.50
No. 1 busheling	5.00 to 5.50
Cast iron borings and shoveling turnings	4.00 to 4.50
Rails for rolling	10.00 to 10.50
Machine shop turnings	3.50 to 4.00
Heavy turnings	5.50 to 6.00
Steel car axles	12.50 to 13.00
Iron car axles	15.00 to 16.00
No. 1 railroad wrought	6.50 to 7.00
Steel rails less than 3 ft.	11.75 to 12.25
Steel angle bars	9.50 to 10.00
Cast iron carwheels	7.50 to 8.00
No. 1 machinery cast	9.00 to 9.50
Railroad malleable	9.50 to 10.00
No. 1 railroad cast	8.00 to 8.50
Stove plate	6.50 to 7.00
Agricult. malleable	8.50 to 9.00

DETROIT

Dealers' buying prices per gross ton:

Heavy melting steel	$7.50 to $8.00
Borings and short turnings	4.25 to 4.75
Long turnings	$3.50 to $4.00
No. 1 machinery cast	10.25 to 10.75
Automotive cast	10.75 to 11.25
Hydraul. comp. sheets	7.50 to 8.00
Stove plate	6.50 to 7.00
New factory bushelings	6.50 to 7.00
Old No. 2 busheling	4.00 to 4.50
Sheet clippings	4.50 to 5.00
Flashings	7.25 to 7.75
Low phos. plate scrap	8.00 to 8.50

CANADA

Dealers' buying prices per gross ton:

	Toronto	Montreal
Heavy melting steel	$7.00	$7.50
Rails scrap	8.00	8.50
Machine shop turnings	3.00	3.00
Boiler plate	4.50	4.50
Heavy axle turnings	4.50	4.50
Cast borings	4.00	3.50
Steel borings	2.00	2.00
Wrought pipe	3.50	3.50
Steel axles	7.00	8.00
Axles, wrought iron	7.00	8.00
No. 1 machinery cast	9.00	9.00
Stove plate	5.50	6.00
Standard carwheels	7.25	7.00
Malleable	6.75	7.00

ORES, FLUORSPAR, COKE, FUEL, REFRACTORIES

Lake Superior Ores

Delivered Lower Lake Ports

	Per Gross Ton
Old range, Bessemer, 51.50% iron	$4.80
Old range, non-Bessemer, 51.50% iron	4.65
Mesabi, Bessemer, 51.50% iron	4.65
Mesabi, non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore

C.i.f. Philadelphia or Baltimore

	Per Unit
Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algeria	9.50c.
Iron, low phos., Swedish, aver. 68½% iron	9.50c.
Iron, basic or foundry, Swedish, aver. 65% iron	9c.
Iron, basic or foundry, Russian, aver. 65% iron	9c.
Manganese, Caucasian, washed 52%	26c.
Manganese, African, Indian, 44-48%	21c.
Manganese, African, Indian, 49-51%	24c.
Manganese, Brazilian, 46 to 48½%	20c.

	Per Net Ton Unit
Tungsten, Chinese, wolframite, duty paid, delivered*	$17.50 to $18.50
Tungsten, domestic scheelite, delivered†	17.00

	Per Gross Ton
Chrome, 45%, Cr_2O_3, crude, c.i.f. Atlantic Seaboard	$17.00
Chrome, 48%, Cr_2O_3, c.i.f. Atlantic Seaboard	20.00

*Quotations nominal in absence of sales.
†Nominal; no supplies available.

Fluorspar

	Per Net Ton
Domestic, washed gravel, 85-5, f.o.b. Kentucky and Illinois mines for all-rail shipment	$13.00
Same grade for Ohio River barge shipment for Kentucky and Illinois River landings	16.00
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	14.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid	19.00
Domestic, No. 1 ground bulk, 93 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	30.00

COKE, COAL AND FUEL OIL

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville Prompt	$3.85
Foundry, f.o.b. Connellsville Prompt	$4.60 to 5.10
Foundry, by-product, Chicago ovens, for delivery outside switching district	8.50
Foundry, by-product, delivered in Chicago switching district	9.25
Foundry, by-product, New England, delivered	11.00
Foundry, by-product, Newark or Jersey City, del'd	8.20 to 8.81
Foundry, by-product, Phila.	9.00
Foundry, by-product, Cleveland, delivered	8.5
Foundry, Birmingham	6.0
Foundry, by-product, St. Louis, f.o.b. ovens	8.0
Foundry, by-product, del'd St. Louis	8.0

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	$1.80 to $2.0
Mine run coking coal, f.o.b. W. Pa.	2.05 to 2.2
Gas coal, ¾-in., f.o.b. Pa. mines	2.25 to 2.5
Mine run gas coal, f.o.b. Pa. mines	2.05 to 2.0
Steam slack, f.o.b. W. Pa. mines	1.55 to 1.6
Gas slack, f.o.b. W. Pa. mines	1.90 to 2.0

Fuel Oil

Per Gal. f.o.b. Bayonne, N. J.	
No. 3 distillate	4.0
No. 4 industrial	3.5
Per Gal. f.o.b. Baltimore	
No. 3 distillate	4.0
No. 4 industrial	3.5
Per Gal. del'd Chicago	
No. 3 industrial fuel oil	3.0
No. 5 industrial fuel oil	2.5
Per Gal. f.o.b. Cleveland	
No. 3 distillate	4.5
No. 4 industrial	3.5
No. 5 industrial	4.5

REFRACTORIES

Fire Clay Brick

	Per 1000 f.o.b. Works High-heat Duty Brick	Intermediate Duty Brick
Pennsylvania	$45.00	$40.0
Maryland	45.00	40.0
New Jersey	55.00	45.0
Ohio	45.00	40.0
Kentucky	45.00	40.0
Missouri	45.00	40.0
Illinois	45.00	40.0
Ground fire clay, per ton	7.00	

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$45.0
Chicago District	50.0
Birmingham	55.0
Silica clay, per net ton	6.0

Chrome Brick

	Per Net Ton
Standard, f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	$45.0
Chemically Bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	45.0

Magnesite Brick

	Per Net Ton
Standard, f.o.b. Baltimore and Chester, Pa.	$65.0
Chemically Bonded, f.o.b. Baltimore	55.0

Grain Magnesite

	Per Net Ton
Imported, f.o.b. Baltimore and Chester, Pa.	$45.0
Domestic, f.o.b. Baltimore and Chester	40.0
Domestic, f.o.b. Chewelah, Wash.	35.0

Warehouse Prices for Steel Products

PITTSBURGH

	Base per Lb.
Plates	3.15c.
Structural shapes	3.15c.
Soft steel bars and small shapes	2.90c.
Reinforcing steel bars	2.90c.
Cold-finished and screw stock:	
Rounds and hexagons	*3.45c.
Squares and flats	*3.45c.
Hoops and bands under ¼ in.	3.20c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles	3.30c.
Galv. sheets (No. 24), 25 or more bundles	3.95c.
Hot-rolled sheets (No. 10)	2.95c.
Galv. corrug. sheets (No. 28), per square (more than 3750 lb.)	$3.69
Spikes, large	2.90c.
Track bolts, all sizes, per 100 count,	65 per cent off list.
Machine bolts, 100 counts,	65 per cent off list.
Carriage bolts, 100 count,	65 per cent off list.
Nuts, all styles, 100 count,	65 per cent off list.
Large rivets, base per 100 lb.	$3.50
Wire, black, soft ann'l'd, base per 100 lb.	*2.70
Wire, galv. soft, base per 100 lb.	*2.925
Common wire nails, per keg	*2.834
Cement coated nails, per keg	*2.834

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applies to orders of 400 to 9999 lb.

*Delivered in Pittsburgh switching district.

CHICAGO

	Base per Lb.
Plates and structural shapes	3.20c.
Soft steel bars	2.95c.
Cold-fin. steel bars:	
Rounds and hexagons	3.50c.
Flats and squares	3.50c.
Hot-rolled strip	3.30c.
Hot-rolled annealed sheets (No. 24)	3.85c.
Galv. sheets (No. 24)	4.55c.
Hot-rolled sheets (No. 10)	3.05c.
Spikes (keg lots)	3.50c.
Track bolts (keg lots)	4.65c.
Rivets, structural (keg lots)	3.65c.
Rivets, boiler (keg lots)	3.75c.
	Per Cent Off List
Machine bolts	60 and 5
Carriage bolts	60 and 5
Lag screws	60 and 5
Hot-pressed nuts, sq. tap. or blank	60 and 5
Hot-pressed nuts, hex. tap or blank	60 and 5
Hex. head cap screws	80
Cut point set screws	70 and 10
Flat head bright wood screws	37½ and 10
Spring cotters	50
Stove bolts in full packages	70
Rd. hd. tank rivets, 7/16 in. and smaller	57½
Wrought washers	$4.50 off list
No. 8 black ann'l'd wire per 100 lb.	$3.85
Com. wire nails, base per keg	3.05
Cement c't'd nails, base per keg	3.05

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 9999 lb. All prices are f.o.b. consumers' plants within the Chicago switching district.

NEW YORK

	Base per Lb.
Plates, ¼ in. and heavier	3.40c.
Structural shapes	3.37c.
Soft steel bars, small shapes	3.22c.
Iron bars	3.22c.
Iron bars, swed. charcoal	6.75c. to 7.25c.
Cold-fin. shafting and screw stock:	
Rounds and hexagons	3.92c.
Flats and squares	4.42c.
Cold-rolled; strip, soft and quarter hard	3.32c.
Hoops	3.52c.
Bands	3.52c.
Hot-rolled sheets (No. 10)	3.27c.
Hot-rolled ann'l'd sheets (No. 24*)	3.85c.
Galvanized sheets (No. 24*)	4.50c.
Long terne sheets (No. 24)	5.20c.
Standard tool steel	11.00c.
Wire, black annealed (No. 10)	3.25c.
Wire, galv. (No. 10)	3.85c.
Tire steel, 1 x ½ in. and larger	3.65c.
Open hearth spring steel	4.00c. to 10.00c.
Common wire nails, base, per keg	$3.21
	Per Cent Off List
Machine bolts, cut thread: All diameters	70
Carriage bolts, cut thread: All diameters	70
Boiler tubes:	Per 100 Ft.
Lap welded, 2-in.	$18.05
Seamless welded, 2-in.	19.24
Charcoal iron, 2-in.	24.94
Charcoal iron, 4-in.	63.65

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

ST. LOUIS

	Base per Lb.
Plates and struc. shapes	3.44c.
Bars, soft steel or iron	3.19c.
Cold-fin. rounds, shafting, screw stocks	3.74c.
Hot-rolled annealed sheets (No. 24)	4.09c.
Galv. sheets (No. 24)	4.64c.
Hot-rolled sheets (No. 10)	3.29c.
Black corrug. sheets (No. 24)	4.09c.
*Galv. corrug. sheets	4.64c.
Structural rivets	3.99c.
Boiler rivets	4.09c.
	Per Cent Off List
Tank rivets, 7/16 in. and smaller	55
Machine and carriage bolts, lag screws fittings up bolts, bolt ends, plow bolts, hot-pressed nuts, square and hexagon, tapped or blank, semi-finished nuts: All quantities	70

*No. 26 and lighter take special prices.

PHILADELPHIA

	Base per Lb.
*Plates, ¾-in. and heavier	2.95c.
*Structural shapes	2.95c.
*Soft steel bars, small shapes, iron bars (except bands)	2.90c.
‡Reinforc. steel bars, sq. twisted and deformed	2.955c.
Cold-finished steel bars	3.73c.
*Steel hoops	3.40c.
*Steel bands, No. 12 and 3/16 in., incl.	3.15c.
Spring steel	5.00c.
†Hot-rolled anneal. sheets (No. 24)	3.55c.
†Galvanized sheets (No. 24)	4.25c.
*Hot-rolled annealed sheets (No. 10)	3.05c.
Diam. pat. floor plates, ¼ in.	4.95c.
Swedish iron bars	6.25c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

*Base prices subject to deduction on orders aggregating 4000 lb. or over.

†For 50 bundles or over.

‡For less than 2000 lb.

CLEVELAND

	Base per Lb.
Plates and struc. shapes	3.31c.
Soft steel bars	2.95c.
Reinforc. steel bars	*2.10c.
Cold-finished steel bars	3.40c.
Flat-rolled steel under ¼ in.	3.36c.
Cold-finished strip	†3.00c.
Hot-rolled annealed sheets (No. 24)	3.96c.
Galvanized sheets (No. 24)	4.61c.
Hot-rolled sheets (No. 10)	3.11c.
Hot-rolled 3/16 in. 24 to 48 in. wide sheets	3.56c.
Black ann'l'd wire, per 100 lb.	$2.65
No. 9 galv. wire, per 100 lb.	3.00
Com. wire nails, base per keg	2.40

*Plus mill, size and quantity extras.
†Outside delivery 10c. less.

CINCINNATI

	Base per Lb.
Plates and struc. shapes	3.40c.
Bars, soft steel or iron	3.15c.
New billet reinforc. bars	3.25c.
Rail steel reinforc. bars	3.25c.
Hoops and bands, 3/16 in. and lighter	3.45c.
Cold-finished bars	3.75c.
Hot-rolled annealed sheets (No. 24)	4.00c.
Galv. sheets (No. 24)	4.70c.
Hot-rolled sheets (No. 10)	3.20c.
Structural rivets	4.35c.
Small rivets	55 per cent off list
No. 9 ann'l'd wire, per 100 lb. (1000 lb. or over)	$2.91
Com. wire nails, base per keg:	
1 to 24 kegs	3.50
25 to 50 kegs	3.30
Large quantities	3.10
Cement c't'd nails, base 100-lb. keg	3.50
Chain, 1-in., per 100 lb.	8.35
	Net per 100 Ft.
Seamless steel boiler tubes, 2-in.	$19.03
4-in.	44.96
Lap-welded steel boiler tubes, 2-in.	18.10
4-in.	42.32

BUFFALO

	Base per Lb.
Plates	3.37c.
Struc. shapes	3.25c.
Soft. steel bars	3.00c.
Reinforcing bars	2.60c.
Cold-fin. flats and sq.	3.55c.
Round and hex.	3.55c.
Cold-rolled strip steel	3.19c.
Hot-rolled annealed sheets (No. 24)	4.05c.
Heavy hot-rolled sheets, 3/16 in., 24 to 48 in. wide	3.62c.
Galv. sheets (No. 24)	4.70c.
Bands	3.42c.
Hoops	3.42c.
Hot-rolled unannealed sheets	3.17c.
Com. wire nails, base per keg	$3.35
Black wire, base per 100 lb.	3.55

BOSTON

	Per Lb. Base
Beams, channels, angles, tees, zees	3.52c.
H beams and shapes	3.52c.
Plates—sheared, tank and univ. mill, ¼ in. thick and heavier	3.53c.
Floor plates, diamond pattern	5.33c.
Bar and bar shapes (mild steel)	3.30c.
Bands 3/16 in. thick and No. 12 ga. incl.	3.60c. to 4.60c
Half rounds, half ovals, ovals and bevels	4.55c.
Tire steel	4.55c.
Cold-finished rounds, squares and hexagons	4.00c.
Cold-rolled strip steel	3.245c.
Cold-finished flats	3.85c.
Blue annealed sheets, No. 10 gal.	3.60c.
One pass cold-rolled sheets No. 24 ga.	4.15c.
Galvanized steel sheets, No. 24 ga.	4.85c.
Lead coated sheets, No. 24 ga.	5.80c.

Prices delivered by truck in metropolitan Boston, subject to quantity differentials.

MILWAUKEE

	Base per Lb.
Plates and structural shapes	3.31c.
Soft steel bars	3.06c.
Hot-rolled strip	3.41c.
Hot-rolled sheets (No. 10)	3.16c.
Hot-rolled annealed sheets (No. 24)	3.96c.
Galvanized sheets (No. 24)	4.66c.
Cold-finished steel bars	3.61c
Cold-rolled strip	3.30c.
Structural rivets (keg lots)	3.86c.
Boiler rivets (keg lots)	3.96c.
Track spikes (keg lots)	3.71c.
Track bolts (keg lots)	4.86c.
Black annealed wire	3.10c.
Com. wire nails	2.90c.
Cement coated nails	2.90c.
	Per Cent Off List
Machine bolts	70
Carriage bolts	70
Hot-pressed nuts, sq. and hex., tapped or blank (keg lots)	70

Prices given above are delivered Milwaukee.

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 9999 lb. On galvanized and No. 24 hot-rolled annealed sheets the prices given apply on orders of 400 to 3499 lb. On cold-finished bars the prices are for orders of 300 to 499 lb.

PACIFIC COAST

	Base per Lb.		
	San Francisco	Los Angeles	Seattle
Plates, tank and U. M.	3.55c.	3.60c.	3.55c.
Shapes, standard	3.55c.	3.60c.	3.55c.
Soft steel bars	3.60c.	3.60c.	3.60c.
Reinforcing bars, f.o.b. cars dock Pacific ports	2.45c.	2.45c.	2.45c.
Hot-rolled annealed sheets (No. 24)	4.40c.	4.35c.	4.40c.
Hot-rolled sheets (No. 10)	3.75c.	3.70c.	3.75c.
Galv. sheets (No. 24)	5.00c.	4.95c.	5.00c.
Cold finished steel: Rounds	5.95c.	5.85c.	6.00c.
Squares and hexagons	7.20c.	7.10c.	7.25c.
Flats	7.70c.	7.60c.	8.25c.
Common wire nails —base per keg less carload	$3.30	$3.40	$3.30

All items subject to differentials for quantity.

TOOL STEEL

Prices are same for warehouse distribution at all points on or East of Mississippi River. West of Mississippi quotations are 1c. a lb. higher.

	Base per Lb.
High speed	57c.
High carbon chrome	37c.
Oil hardening	22c.
Extra	17c.
Regular	14c.

Weekly Indications of Steel Activity

From THE IRON AGE

	Mar. 26, 1935	Mar. 19, 1935	Feb. 26, 1935	Mar. 27, 1934	Average, Year to Date 1935	1934
Steel ingot operations—Per cent of capacity	46.5	47.0	48.5	48.0	49.5	40.4

	Week Ended Mar. 26, 1935	Mar. 19, 1935	Feb. 26, 1935	Mar. 27, 1934	Year to Date 1935	1934
Fabricated structural steel awards	17,600	45,800	6,700	12,250	171,215	200,865
Fabricated plate awards	1,800	1,425	1,460	13,000	22,585	28,882
Sheet steel piling awards	100	915	0	0	3,415	13,495
Reinforcing bar awards	5,710	7,800	5,000	3,950	55,200	51,300

Tin Moves Up 1½c. in Sympathy with London Market—Other Metals Quiet

Lead Prices Very Firm; March Deliveries May Reach 35,000 Tons—Spelter May Advance—Copper Sales Decline

NEW YORK, March 26.—Large world copper producers may have reached an agreement on the foreign market control plan, but the trade in general knows nothing definite as yet. Rumors are that foreign production will be cut 30 per cent and American exports abroad will be limited to about 8000 tons monthly. Even though these figures may be in error, the rumor has had sufficient weight to force through sharp price advances in the London market. Whereas metal was available at 6.65c. a lb. at Continental ports a week ago, one buyer paid 7.15c. for a round tonnage early today. Quotations on domestic Blue Eagle metal remain unchanged, and users here seemingly are not as anxious to cover their future requirements as are the foreign consumers. Sales yesterday amounted to only 300 tons, and total March bookings are now almost 24,000 tons. It is quite possible that final March bookings will equal or surpass the 29,456 tons sold in February.

Tin

The London market has shown a constant tendency to move upward during the past week even in the absence of sizable turnovers of material. This condition developed principally from activity of dealers covering their positions and also from a certain sympathy with copper, which laterally has shown considerable strength in European markets. Naturally enough the New York price of tin moved up with London, and metal was not available today under 47.50c. a lb. in New York, which represents a 1½c. advance over the position of a week ago. When the price was moving down several weeks ago, domestic consumers entered quite sizable commitments, but the strengthening of the past week has apparently frightened potential buyers from the market. About 1000 tons of buffer pool stock has been unloaded at New York and placed in warehouses. None of this metal is being offered for sale, and consequently spot metal continues none too plentiful at the present time. Today's London quotations were £211 and £211 15s. for spot and future standard respectively, and £218 for straits in the Far East.

Zinc

Tri-State ore mines are restricting their production, and this action has already exerted some sympathetic pressure on the spelter market. Sellers who were freely offering metal a week ago are today restricting tonnages to regular buyers. Even though the spot and forward prices remain at 4.25c. and 3.90c. a lb., delivered at New York and East St. Louis, respectively, the current firm undertone of the market indicates that these prices may move up 5 to 10 points on the appearance of heavier purchasing. At present the aggregate forward bookings of leading sellers are at a very low level. New bookings last week totaled 1400 tons of spelter and 600 tons of select zinc, as compared with 2400 tons in the preceding period and 3700 tons booked in the seven-day period a fortnight ago.

Lead

This commodity is currently in an exceptionally firm position on the strength of heavy March sales, a sharp reduction of refined stocks in February, and an $8 a ton advance in London. The leading seller is holding offerings at 3.60c. and 3.45c. a lb., for New York and St. Louis deliveries, respectively, but another seller is booked so heavily that eastern offerings are being held $1 a ton higher at 3.65c., delivered New York. March is almost completely sold, and deliveries for that month should run about 35,000 tons. Current buying is mostly for April delivery, which period is now almost 60 per cent sold. Fair-sized orders are coming in each day, and commitments are well distributed among ammunition makers, battery fabricators, and corroders. During February, smelters' stocks of refined lead decreased 5100 tons as a result of production of 27,400 tons and shipments of 32,500 tons.

The Week's Prices. Cents Per Pound for Early Delivery

	Mar. 20	Mar. 21	Mar. 22	Mar. 23	Mar. 25	Mar. 26
Electrolytic copper, N. Y.*	8.75	8.75	8.75	8.75	8.75	8.75
Lake copper, N. Y.	9.12½	9.12½	9.12½	9.12½	9.12½	9.12½
Straits tin, Spot, New York	45.95	45.80	46.00	....	47.25	47.45
Zinc, East St. Louis	3.90	3.90	3.90	3.90	3.90	3.90
Zinc, New York	4.25	4.25	4.25	4.25	4.25	4.25
Lead, St. Louis	3.45	3.45	3.45	3.45	3.45	3.45
Lead, New York	3.60	3.60	3.60	3.60	3.60	3.60

*Refinery quotations; price ¼c. higher delivered in Connecticut.

Aluminum, virgin 99 per cent plus, 19c. to 22c. a lb., delivered.
Aluminum, remelt No. 12 (alloy), carload lots delivered, 14c. a lb., average for week.
Nickel, electrolytic, 35c. to 36c. a lb. base at refinery in lots of 2 tons or more.
Antimony, 14.50c. a lb., New York.
Brass ingots, 85-5-5-5, 8.25c. a lb., New York and Philadelphia.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	49.50c. to 50.50c.
Tin, bar	51.50c. to 52.50c.
Copper, Lake	10.25c. to 11.00c.
Copper, electrolytic	10.00c. to 10.50c.
Copper, castings	9.75c. to 10.75c.
*Copper sheets, hot-rolled	16.00c.
*High brass sheets	14.25c.
*Seamless brass tubes	16.00c.
*Seamless copper tubes	16.25c.
*Brass rods	12.75c.
Zinc, slabs	5.75c. to 6.75c.
Zinc, sheets (No. 9), casks, 1200 lb. and over	10.25c.
Lead, American pig	4.50c. to 5.50c.
Lead, bar	5.50c. to 6.50c.
Lead, sheets	7.25c.
Antimony, Asiatic	15.50c. to 16.50c.
Alum, virgin, 99 per cent, plus	23.30c.
Alum., No. 1 for remelting, 98 to 99 per cent	18.00c. to 19.00c.
Solder, ½ and ½	30.00c. to 31.00c.
Babbitt metal, commercial grades	25.00c. to 60.00c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

From Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig	51.25c.
Tin, bar	53.25c.
Copper, Lake	10.00c.
Copper, electrolytic	10.00c.
Copper, castings	9.75c.
Zinc, slabs	5.50c. to 5.75c.
Lead, American pig	4.50c. to 4.75c.
Lead, bar	7.75c.
Antimony, Asiatic	16.50c.
Babbitt metal, medium grade	18.50c.
Babbitt metal, high grade	55.25c.
Solder, ½ and ½	31.00c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	5.62½c.	6.37½c.
Copper, hvy. and wire	5.50c.	6.00c.
Copper, light and bottoms	4.50c.	5.00c.
Brass, heavy	2.87½c.	3.50c.
Brass, light	2.12½c.	2.87½c.
Hvy. machine composition	4.50c.	5.00c.
No. 1 yel. brass turnings	3.87½c.	4.37½c.
No. 1 red brass or compos. turnings	4.12½c.	4.62½c.
Lead, heavy	2.62½c.	3.00c.
Zinc	2.00c.	2.37½c.
Cast aluminum	10.12½c.	11.25c.
Sheet aluminum	11.50c.	13.00c.

Reinforcing Steel

Awards 5710 Tons—New Projects 3450 Tons

AWARDS

Somerville, Mass., 150 tons, school, to Barker Steel Co.

Cheshire, Mass., 100 tons, State road, to American Steel & Wire Co.

Lackawanna N. Y., 1500 tons, sheet-strip mill for Bethlehem Steel Co., to Kalman Steel Corpn.

Philadelphia, 650 tons, bars for Philadelphia Navy Yard buildings, to Concrete Steel Co.

Cleveland, 100 tons, addition for Telling Belle Vernon Co. to Patterson-Leitch Co.

Jackson, Mich., 687 tons, sewage treatment plant, to Capitol Steel Corpn., Lansing, Mich.

Michigan City, Ind., 582 tons, sewage treatment plant, to Concrete Steel Co.

Chicago, 550 tons, plant for Fleischmann Malting Co., to Joseph T. Ryerson & Son.

Chicago, 475 tons, Goldblatt department store, to Inland Steel Co., previously reported to an unnamed bidder.

Milwaukee County, Wis., 200 tons, laundry for County institutions, to Concrete Steel Co.

Altadena, Cal., 100 tons, school alterations, to Hammond Lumber Co.

San Fernando, Cal., 106 tons, lemon packing plant, to Truscon Steel Co.

Los Angeles, 102 tons, reconstruction of addition at David Starr Jordan school, to Soule Steel Co.

Newport Beach, Cal., 152 tons, elementary school, to Graham Brothers.

Los Angeles, 250 tons, building at Hollywood high school, to Truscon Steel Co.

Los Angeles, 269 tons, building at Robert Louis Stevenson school, to Truscon Steel Co.

Vancouver, Wash., 200 tons, plant for Great Western Malting Co., to Truscon Steel Co.

NEW REINFORCING BAR PROJECTS

Dublin, Franklin County, Ohio, 336 tons, highway bridge; E. Elford & Son Co., Columbus, general contractor.

Zanesville, Ohio, 700 tons, Mohawk dam, in connection with Muskingum District Conservation project; George M. Brewster & Son Co., Bogota, N. J., general contractor.

Zanesville, 100 tons, for work in connection with relocating Pennsylvania Railroad tracks; George W. Condon Co., Omaha, low bidder.

Zanesville, 100 tons, Senecaville dam, in connection with Muskingum District Conservation project; bids April 2.

Milwaukee, 3500 tons, sewage filter plant; Kramp Construction Co., Berlin, Wis., low bidder on general contract.

Chicago, 600 tons, Olsen Rug Co. plant; revised bids taken.

Chicago, 750 tons, South Side intercepting sewer, No. 3; S. A. Healy Co. low bidder on general contract.

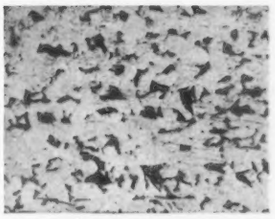
Santa Clara County, Cal., 117 tons, Coyote dam and spillway; bids April 5.

Berkeley, Cal., 285 tons, State grade separation at Folger Avenue; plans completed.

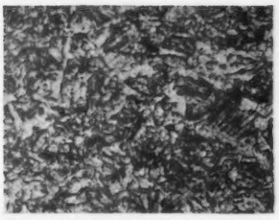
Plumas County, Cal., 100 tons, two State bridges over North Fork of Feather River; bids April 10.

WYCKOFF *Controlled*

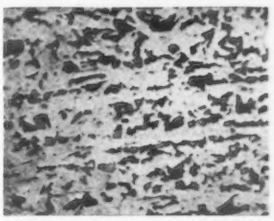
MANGANESE STEELS



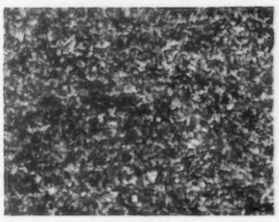
Uncontrolled Steel — magnification 67 x—etched.



Wyckoff Controlled Manganese Steel as rolled — Magnification 67 x — etched.



Uncontrolled Steel, cooled rapidly in air from 1900° F.



Wyckoff Controlled cooled rapidly in air from 1900° F.

In a recent series of tests conducted by a large eastern manufacturer, interested in obtaining a steel that would give maximum results in both uniformity and machinability, Wyckoff Controlled Manganese Steel, proved conclusively its superiority over the steels heretofore used as shown in the illustrations above.

In these tests, the superior machinability of Wyckoff Controlled Manganese Steel and its close grained structure were outstanding. After machining, it was further subjected to heating in Cyanide at 1450° F. and quenched in oil, definitely proving that its fine grain characteristics insured the MINIMUM amount of distortion.

Investigate Wyckoff Controlled Manganese Steel!

WYCKOFF DRAWN STEEL COMPANY

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Manufacturers of **Cold Drawn Steels**

Turned and Polished Shafting **Turned and Ground Shafting**

Eureka, Cal., 290 tons, Mad River dam and pipe line; bids about March 29.

Long Beach, Cal., 103 tons, units A and B at John Dewey junior high school, bids opened.

Los Angeles, 265 tons, buildings A and B at Manual Arts junior high school, bids April 2.

Los Angeles, 260 tons, Washington junior high school administration building; bids under advisement.

Los Angeles, 163 tons, city vehicular tunnel on Figueroa Street; bids April 3.

Seattle, 172 tons, Railway Avenue, seawall; bids opened.

Detroit Scrap Market Weaker

DETROIT, March 26.—The local scrap market is quiet with prices tending to sag as the automobile industry continues to produce large quantities of old material. No. 2 busheling and low phosphorus plate scrap are down 25c. a ton. Other items remain unchanged, although dealers expect lower prices to develop in the coming week.

Fabricated Structural Steel

Lettings in Fair Volume—New Projects Light

AMONG awards of 17,600 tons, the outstanding booking is 10,000 tons for a sheet strip mill at Lackawanna, N. Y., for the Bethlehem Steel Co. Other lettings were mostly in small tonnages. New projects of 2600 tons are the lowest since the first week in April, 1933, and compare with 6025 tons last week and 22,110 tons two weeks ago. Plate awards total 1800 tons, with 14,000 tons pending, including 10,000 tons for penstocks for the Grand Coulee Dam. Structural steel contracts in March called for 79,150 tons, compared with 46,105 tons in February and 55,860 tons in January. Structural steel awards for the week follow:

NORTH ATLANTIC STATES

Lowell, Mass., 220 tons, street railway garage, to New England Structural Co.

Hartford, Conn., 280 tons, chemical building at Trinity College, to Lehigh Structural Steel Co.

New York, 250 tons, Coney Island sewage plant, to McClintic-Marshall Corpn.

New York Central, 330 tons, bridge at West 171st Street, New York, to McClintic-Marshall Corpn.

New York, 150 tons, housing alterations at 138 East Third Street, to Alpha Iron Works.

Brooklyn, 510 tons, Washington Avenue bridge, to Phoenix Bridge Works.

Brooklyn, 210 tons, alterations to Balch-Price building, to George A. Just Co.

Harrisburg, Pa., 315 tons, transmission towers for Pennsylvania Power & Light Co., to Lehigh Structural Steel Co.

Lackawana, N. Y., 10,000 tons, sheet strip mill for Bethlehem Steel Co., to McClintic-Marshall Corpn.

SOUTH AND SOUTHWEST

Gainesville, Ga., 200 tons, bridge, to Johnson City Foundry & Machine Co.

Hosford, Fla., 100 tons, State bridge, to Bethlehem Fabricators, Inc.

Jackson County, Ark., 230 tons, to Virginia Bridge & Iron Co.

Maricopa County, Ariz., 745 tons, Municipal Water Conservation District, to Mississippi Valley Structural Steel Co.

Kirkville, Tex., 475 tons, bridge to Pittsburgh-Des Moines Steel Co.

Pecos, Tex., 175 tons, post office, to Austin Brothers Structural Steel Co., Dallas, Tex.

Austin, Tex., 195 tons, shop building, to Austin Brothers Structural Steel Co.

Childress County, Tex., 120 tons, bridge, to North Texas Iron & Steel Co.

CENTRAL STATES

Cleveland, 130 tons, repairs to Harvard-Denison bridge, to Republic Structural Iron Works.

Villa Grove, Ill., 250 tons State highway bridge to Mississippi Valley Structural Steel Co.

Chicago, 475 tons, plant for Fleischmann Malting Co., to an unnamed fabricator.

Wood River, Ill., 300 tons, refinery for Shell Petroleum Corpn., to Superior Structural Steel Co., St. Louis.

Cicero and Muncie, Ind., 225 tons, bridges, to Port Pitt Bridge Works Co.

Sioux City, Iowa, 240 tons, bridge, to Pittsburgh-Des Moines Steel Co.

Chippewa Falls, Wis., 150 tons, bridge, to Eau Claire Engineering Co.

State of Minnesota, 200 tons, state bridges, to McClintic-Marshall Corpn.

State of South Dakota, 200 tons, bridges No. NRS 300-B and No. NRM 160-B, to Hassentein Steel Co.

WESTERN STATES

Boulder Dam, 258 tons, cable supports, specification 609; placed by Bureau of Reclamation, Denver, with Midwest Steel & Iron Works Co., Denver.

Huntington Park, Cal., 100 tons, post office, to Pacific Coast Steel Corpn.

Los Angeles, 100 tons, tunnel forms for Metropolitan Water District, to Pacific Iron & Steel Co.

Seattle, 100 tons, repairs on S. S. Peoples, to Wallace Bridge & Structural Steel Co.

Bonneville, Ore., 350 tons, ship lock emergency dam, to Pacific Car & Foundry Co.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

State of New York, 640 tons, State highway bridges at Rosedale and Utica.

West Hampton Beach, N. Y., 250 tons, State highway bridge.

Passaic County, N. J., 150 tons, highway bridge; bids due April 8.

Woodville, Pa., 500 tons, Allegheny County Home.

THE SOUTH

New Tazewell, Tenn., 1200 tons, bridge over Clinch River for Tennessee Valley Authority; Nashville Bridge Co. low bidder.

CENTRAL STATES

Zanesville, Ohio, 200 tons, Sixth Street bridge.

Belleville, Ill., 180 tons, State highway bridge.

Clarksville, Mo., 230 tons, State highway bridge.

WESTERN STATES

Plumas County, Cal., 340 tons, two State bridges on North Fork of Feather River; bids April 10.

Eureka, Cal., 100 tons, Mad River dam and pipe line; bids about March 29.

FABRICATED PLATE

AWARDS

Shoemakersville, Pa., 105 tons, elevated tank, to Chicago Bridge & Iron Works.

Aurora, Ill., 670 tons, elevated tank, to Chicago Bridge & Iron Works.

Grand Haven, Mich., 425 tons, two dump scows for United States Engineers, to McClintic-Marshall Corpn.

Paxton, Neb., 600 tons, syphon, to Kansas City Structural Steel Co.

NEW PROJECTS

Buffalo, 1000 tons, pipe line.

Pittsburgh, 1200 to 1800 tons, plates and shapes, six to nine oil barges; bids soon.

Almira, Wash., 10,000 tons, 18-ft. penstocks for Grand Coulee dam; bids expected within 90 days.

Eureka, Cal., 1300 to 1600 tons, Mad River pipe line, alternates on steel and wood and also different types of coatings and linings; call for bids about March 29.

SHEET PILING

AWARDS

Snohomish County, Wash., 100 tons sheet piling, State bridge over Ebey Slough, to Pacific Coast Steel Corpn.

Railroad Equipment

Seaboard Air Line has ordered four locomotive tenders from Baldwin Locomotive Works.

Atchison, Topeka & Santa Fe is inquiring for two streamlined type mail and baggage cars.

Chicago, Burlington & Quincy has ordered the fourth streamlined Zephyr train from Edward G. Budd Mfg. Co.

RAILS

Chicago Great Western has ordered 5000 tons of rails, of which 4000 tons went to Illinois Steel Co. and 1000 tons to Inland Steel Co.

George W. Condon Co., Omaha, is low bidder for relocating 1500 tons of Pennsylvania Railroad tracks in connection with Muskingum District Conservation project. Bids will be taken by the United States Engineers, Zanesville, Ohio, May 7, for relocating the Baltimore & Ohio track at Beach City. Rail tonnage has not yet been estimated.

Chicago & North Western has ordered 25,000 tons of rails, of which 18,000 tons went to Illinois Steel Co. and 7000 tons to Inland Steel Co. Orders for 9000 tons of accessories were divided among 10 companies.

Chicago Iron and Steel Market

(CONCLUDED FROM PAGE 57)

Co., and 1000 tons from the Inland Steel Co. Only about 4000 tons of rails are now pending in this market and the total is made up of small miscellaneous lots. Scattered orders for track accessories total 4000 tons.

Scrap

In the absence of sizable consumer purchases, the pressure of material for sale has again weakened prices and the market has broken on a number of items to the extent of 25c. a ton. Offerings of country scrap and industrial material are not as excessive as might be expected. Country dealers are again speculating against possible inflation, while industries that are active are disinclined to sell scrap at price reductions. The metropolitan trade, however, is bearish and is anxious to dispose of material before the market sinks to still lower levels. The Burlington took bids on 1000 tons Tuesday and the Alton on 750 tons Wednesday.

Hearings Ended on Republic Suit

THE hearing in the suit to prevent the merger of Republic Steel Corpn. and the Corrigan, McKinney Steel Co. was concluded in the Federal District Court in Cleveland on March 22. Both sides were ordered to submit final briefs by April 15, and a decision is promised around May 1.

Several officers of both companies and executives of other steel companies were called by the defense to bear out its contention that competition in the steel industry would not be eliminated by the merger. Tom M. Girdler, president of Republic, testified that four big steel companies could be put together and the price of steel would not increase. Donald B. Gillies, president, and R. C. Allen, a director of the Corrigan, McKinney company, told the court that the company was facing a continuous falling off of orders for semi-finished steel products and that it did not have the facilities at present to turn these into finished products. The number of the company's customers, he said, had been on the decline since 1924. Mr. Allen said that the company's market for sheet bars had narrowed to five principal consumers and that the Newton Steel Co. had been taken over to maintain it as an outlet for Corrigan, McKinney products.

George M. Humphrey, president, Hanna Furnace Corpn., and chairman of the executive committee of the National Steel Corpn., and W. W. Holloway, president, Wheeling Steel Corpn., Wheeling, W. Va., testified that the merger would have no effect on competition in the steel industry unless it were to make the combined companies a stronger competitor. W. W. Seebald, vice-president, American Rolling Mill Co., Middletown, Ohio, and Edward M. Adams, first vice-president, Inland Steel Co., substantiated the testimony of other witnesses to the effect that the proposed merger would not affect competition in the steel industry.

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Pipe Lines

Supervisor of Purchases, Subsistence Homesteads Division, Department of Interior, Washington, asks bids until April 5 for 32,850 ft. of 1-in. and 920 ft. of ¾-in. galvanized steel pipe, also for galvanized steel nipples, galvanized bushings, unions, galvanized malleable tees, etc., for project at El Monte, Cal.

General Pipe Line Co. of California, 108 West Second Street, Los Angeles, has asked bids for 10-in. seamless, electric-welded steel pipe line from oil refinery and pumping plant at Lebec, Cal., of General Petroleum Corpn., parent organization, to tank storage and distribution plant at Torrance, Cal., about 88 miles. Line will have rated capacity of 40,000 bbl. per day. Cost close to $1,500,000.

Iowa City Light & Power Co., Iowa City, Iowa, plans natural gas steel pipe line to connect with present city main. Cost about $50,000. United Light & Power Engineering & Construction Co., 205 Perry Street, Davenport, Iowa, will be in charge of project.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until April 9 for steel pipe, also for wrought iron pipe and fittings for Portsmouth, N. H., Navy Yard (Schedule 4576).

Everett, Wash., plans steel pipe line for water supply for new local pulp mill to be erected by Weyerhaeuser Timber Co., Tacoma, Wash., including 8750 ft. of 16 and 36-in. Cost about $100,000. Early financing is being arranged. Granville Paine is water superintendent.

Board of Supervisors, Tulare County, Visalia, Cal., has called special election May 10 to approve organization of Central Counties Municipal Utilities District, to build welded steel pipe line for natural gas service at Visalia, Porterville, Tulare, Hanford, Lindsay, Exeter, Lemoore and vicinity. Main line will extend from gas fields in Kettleman Hills district to different municipalities, about 90 miles; steel pipe line distribution systems will be installed in cities and towns stated. Cost about $900,000.

Cast Iron Pipe

Florence Pipe & Foundry Co. was low bidder on 56,500 ft. of 6 to 10-in. required by Wareham, Mass. On 22 tons of fittings, all bidders submitted same price.

Hinsdale, N. H., closes bids April 4 for main water and distribution lines (Contract No. 3); steel standpipes (Contract No. 4), and intake works and purification plant (Contract No. 2). Metcalf & Eddy, Statler Building, Boston, are consulting engineers.

Scio, N. Y., has approved bond issue of $48,000 for water pipe lines, pumping plant, reservoir and other water-works installation. T. J. Major, Scio, and E. J. Rowe, Wellsville, N. Y., are consulting engineers.

Elk City, Okla., plans about 14 miles of 14-in. for main water line; also a distribution system. Cost $350,000. Financing is being arranged through Federal aid. E. T. Archer & Co., New England Building, Kansas City, Mo., are consulting engineers.

Spencer, S. D., will soon take bids for about 12,000 ft. for water lines, 50,000-gal. elevated steel tank and pumping equipment. Cost about $32,000. Financing has been arranged. A. McWayne, 322 Paulton Block, Sioux Falls, S. D., is consulting engineer.

Central City, Neb., closes bids April 8 for 2, 4 and 6-in., in 12-ft. lengths for water lines, and 2, 4 and 6-in. bell and spigot, in 12 and 16-ft. lengths.

Mancos, Colo., plans water pipe lines, including distribution mains.

Chicago has equally divided 2100 tons of 6 to 16-in. between Lynchburg Foundry Co. and United States Pipe & Foundry Co.

Walnut Creek, Cal., plans pipe lines and other water-works equipment for new system. Cost about $40,000. E. B. Bradley, mayor, is in charge.

Fort Smith, Ark., plans about 23 miles of 27-in. for gravity flow water supply; also construction of dam on Clear Creek and 6,000,000-gal. filtration plant. Cost about $1,600,000. W. R. Holway, 302 East Eighteenth Street, Tulsa, Okla., is consulting engineer.

Tom Bean, Tex., closes bids April 5 for about 4700 ft. 6 and 8-in. for water supply; also for 50,000-gal. elevated steel tank and tower. D. C. Walmsley, Thomas Building, Dallas, Tex., is consulting engineer.

Sargeant, Minn., plans about 5000 ft. of 4 and 6-in. for water system. Banister Engineering Co., 556 North Prior Avenue, St. Paul, Minn., is consulting engineer.

Odem, Tex., closes bids April 4 for water pipe lines, elevated tank and tower, pumping machinery and other water-works equipment. David M. Duller, Second National Bank Building, Houston, Tex., is consulting engineer.

Attractive Finish Helps Metal Products Sales

(CONTINUED FROM PAGE 27)

terial is reported when barrels are used for certain types of enameling. Barrel galvanizing and plating are common. Recently a practical process of barrel chromium plating has been developed. Other barrel operations include cleaning, pickling, bluing, cement coating, heat treating and stripping. This article, however, is chiefly concerned with burnishing and tumbling.

and forge shops, H. Leroy Beaver, Philadelphia, emphasized the importance of preceding operations. "We cannot start," he said, "with the actual tumbling operation itself as most manufacturers would have us do, because our experience has been that before the tumbling operation is even to be thought of there are certain matters of detail that generally require adjustment in order that parts really susceptible to finishing by the barrel method may be delivered to the barrels."

ordinary rough casting that is to be later machined or ground with set-up wheels, this may be well enough, but for barrel finishing every precaution possible should be taken to deliver as smooth a casting as possible to the tumbling barrels. If sprues or parting fins cannot be avoided then extreme care should be taken that not too coarse a grinding wheel is used in removing them as this will require longer operation in the barrels.

One popular misconception about tumbling barrels is that by some magic they will smooth down all irregularities. Thus many expect the barrel to remove sprues, fins and sharp projections without in any way affecting the rest of the

CHANGE the variable but slightly in burnishing and you may noticeably change the finish. This shows a corner of the burnishing shop where products of different machines are being compared

Courtesy The Abbott Ball Co.

The acid dip is often used in connection with tumbling as an auxiliary process. Sometimes the acid is sufficient alone. It depends upon the character of the base metal and on what subsequent operations are to be. For plating, the process is frequently acid dip, washing, drying, tumbling, second acid dip, washing, drying and plating. Other sequences in plating are acid dip, washing, drying, polishing, buffing, plating; or, acid dip, washing, drying, tumbling, buffing, plating. Where the base metal is brass it is often impossible to use the acid dip because it brings copper to the surface, causing discoloration.

Castings and Forgings

When interviewed on the general use of barrels in the foundry

Just as snagging and chipping must precede polishing, so must they precede tumbling, and so must correct foundry practice precede the snagging and chipping.

A manufacturer considering the barrel tumbling of his castings should take into account the character and fineness of the sand, and especially the mesh of the screen used by the molders for sifting the sand prior to forming the mold. On this point Mr. Beaver said, "Generally we find that too coarse a screen is used, permitting passage of slag inclusions, small parts chipped from cores, small drags of metal and other odd particles, all of which tend to produce a rough and irregular casting. For the surface area, when a moment's thought should indicate that in the process, material is removed from all parts of the surface and that, while a part may be greatly reduced in size, if the defects are prominent in the first instance they will be prominent in the finished work.

Besides care in molding and snagging, proper pickling is important as a preliminary to efficient barrel tumbling of castings. The pickling procedure has been described in previous articles. Hydrofluoric acid is used in the foundry for removing sand inclusions as it is the only practical acid for dissolving silica. From the pickle and rinse the parts go direct to the tumbling barrels.

An almost endless variety of

barrels confronts the plant manager who would select one for his particular use. There are wet and dry barrels, variable speed barrels, horizontal and tilting barrels. There are barrels that reverse rotation to separate the balls from the work. There are patented bottoms for agitating the work and there are square, hexagonal and special-shape barrels.

In addition to the various types there are differences of size to consider. Mr. Beaver advises the use of a large barrel for most small metal parts in order to give sufficient weight to produce proper abrasive pressure. Commenting further about barrels, Mr. Beaver states: "The impression seems to prevail that a great tumbling about or churning of the work and the abrasive is necessary for proper action. This is not true, for a violent tumbling action only tends to batter the parts being operated and to retard rather than accelerate the finishing of the parts. A mass of grinding material and castings in a barrel, though mobile, should not be liquid. Great pressure is exerted both while at rest and while in motion, but almost diametrically opposite is the ratio between grinding material and parts in the tumbling process and in the burnishing process. In tumbling, the grinding material is almost invariably lighter or of lesser specific gravity than the castings, whereas in burnishing the steel burnishing material is almost invariably heavier in specific gravity than the parts being burnished. In the tumbling process there is little or no difficulty in keeping the parts within the grinding material mass, hence the pressure exerted is a continuous one inasmuch as the parts do not roam into and out of the mass as they often do in the burnishing process."

In the final analysis the selection of barrel must be based on individual conditions such as quantity of work, average size of work, methods of handling material, kind of metal, kind of abrasive, and character of finish desired. Fortunately many barrel manufacturers make a variety of types so that their judgment is unbiased. A good rule is to pick out a good reliable manufacturer and then advise him fully of conditions and ask him to make the selection of type.

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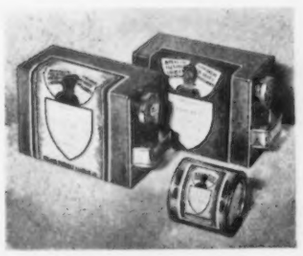
This high-coverage inexpensive lacquer of a hundred uses may be the key to some knotty finishing problem that is troubling you.

WHEN you require a finish to be good-looking . . and INEXPENSIVE, think of LEAFLEX, the outstanding (Air-dry) Aluminum Finish with the Matte Silver appearance. You can finger-nail a LEAFLEX-finished strip . . . . and no aluminum comes off; you can twist it into spiral curls. The adhesion and flexibility of a LEAFLEX finish will amaze you.

DIFFERENT LEAFING ACTION

Even the "leafing" action of this inexpensive high-coverage aluminum finish is different. You can actually see the finish become *smoother and brighter* as the solvent evaporates. And this outstanding finish saves 25% on powder costs! Gives you a beautiful, uniform, practical "cover-up" finish. You can use LEAFLEX effectively on STEEL, DIE-CAST METAL, BRASS, ALUMINUM, WOOD, COMPOSITION, etc. This money-saving finish works well *indoors or outdoors.*

Let us send you the LEAFLEX-KIT (described above) on trial. Try this material on some product or part. Only by playing with LEAFLEX will you discover the many applications of this truly versatile finish. If for any reason you are not satisfied with your LEAFLEX-KIT ($1.75), return it at our expense and full credit will be issued.



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Flexible
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Some authorities feel that the choice of abrasive is less important than the choice of barrel. One says: "As to abrasive materials the choice is wide, and the abrasive used in a particular locality is generally the one most readily available at the lowest cost. Indeed the choice of abrasives is so wide that it would be almost impossible to enumerate them, but the ones most used and most readily available are cinders, sharp sand, and foundry slag, for these three are found in practically every manufacturing community."

Under the heading of tumbling come some processes which combine a peening action with abrasion and in such cases balls, stars or jacks may be used. These are

CARNEGIE ABRASION RESISTING STEEL AGAIN PROVES ITS SUPERIOR QUALITIES

On a recent dredging operation on the Columbia River, two kinds of dredge pipe were used. The engineer reports that:

After handling 3,000,000 cu. yds. of sand and gravel, the mild steel dredge pipe was worn through. The pipe made from Carnegie Abrasion Resisting Steel had merely been well polished.

This is a typical report from a user of Carnegie Abrasion Resisting Steel. In a wide variety of applications, results are consistently successful. *Your inquiries are solicited.* 323

CARNEGIE STEEL COMPANY • PITTSBURGH

United States Steel Corporation Subsidiary

made of various materials, often of heat treated alloy steel.

Dirt that is removed may be separated out by air blast in dry barrels or by continuous flow of water in others.

Burnishing

Strictly speaking, burnishing is not an abrasion process, but in practice the terms tumbling, rolling and burnishing are rather loosely used, and some of the foregoing comments have covered a modification of burnishing rather than burnishing in its strict sense as a peening process. On this point Mr. Mitchell says that burnishing does not rub off but peens down minute surface irregularities and, other things considered, the more complete the process the more even the surface plane and the higher the luster. Mr. Mitchell warns that burnishing does not remove visible surface irregularities, scratches or pits, and does not improve color.

An accompanying illustration shows the use of special shapes to replace the spherical burnishing balls. Experience has shown that an odd shape such as a cylinder with angling end surfaces will reach and effectively burnish corners inaccessible to the steel ball. Of course for general work the most usual agent is the round steel ball. The ball need not be perfectly spherical, but it should be hard and smooth and tough enough to avoid fracture. The determination of shape of the burnishing agent is not a simple matter, for if a certain corner is to be burnished it is not enough to design a shape which will fit the corner. Points and sharp corners must be avoided as much as possible. An extreme case will illustrate this. If steel cubes were used, burnishing would be impossible.

The important thing is for the manufacturer to recognize that seemingly impossible jobs have been solved for satisfactory burnishing, and a failure at first does not mean that the job cannot be handled in a barrel.

Trade Publications

Mechanical Leather Packings and Oil Seals.—Michigan Leather Packing Co., 752 Fourteenth Avenue, Detroit. Bulletin No. 701, describing and illustrating tests of Supertan leather vacuum cups under conditions of intense heat and extreme cold. The cups are subjected to a temperature of 225 deg. F. for 24 hours and then to 62 deg. below freezing for the same period. The cylinder and plunger mechanism, including the vacuum cups, are finally hung up for 24 hr. with a 100-lb. weight suspended from the piston rod to test the vacuum and holding ability of the cup.

Gages.—Langlois Grinding Co., Inc., 1602 Twenty-third Street, Detroit. Attractive, 12-page catalog devoted to cylindrical plug, cylindrical ring, master and chrome plated gages. Wear resisting properties of Langlois metal (tungsten carbide) as applied to various types of gages are discussed briefly.

United Engineering Profits Higher

UNITED ENGINEERING & FOUNDRY CO., Pittsburgh, had net income for 1934, after all expenses, depreciation and provision for Federal taxes, of $718,395, compared with $401,018 in 1933. Earnings in 1934, after dividends on preferred stock, were equivalent to $1.58 a share on the common stock, compared with 82c. a share in 1933.

George T. Ladd, president of the company, in the annual report, stated that although the industry has been operating below the levels of normal business expectancy during the past few years, the condition has improved gradually, with the result that, on the basis of the company's present unfilled orders and prospects for new business, a better than normal level of operation is expected in 1935.

Sheet & Tube Loss Reduced in 1934

THE Youngstown Sheet & Tube Co. had sales of $63,138,122 in 1934, as compared with $49,436,510 in 1933. It sustained a loss of $2,665,119 in 1934, as compared with a loss of $8,342,901 in 1933. Net profits from operations before depletion of minerals, depreciation of plants and interest charges, increased to $7,339,048 in 1934 from $4,634,686 in 1933. Last year the company spent $10,763,898 for plant improvements and betterments. Included in these were the new continuous hot and cold rolled sheet and strip mills at the Campbell works and electric welding equipment at the Brier Hill works.

This Week in Washington

(CONTINUED FROM PAGE 48)

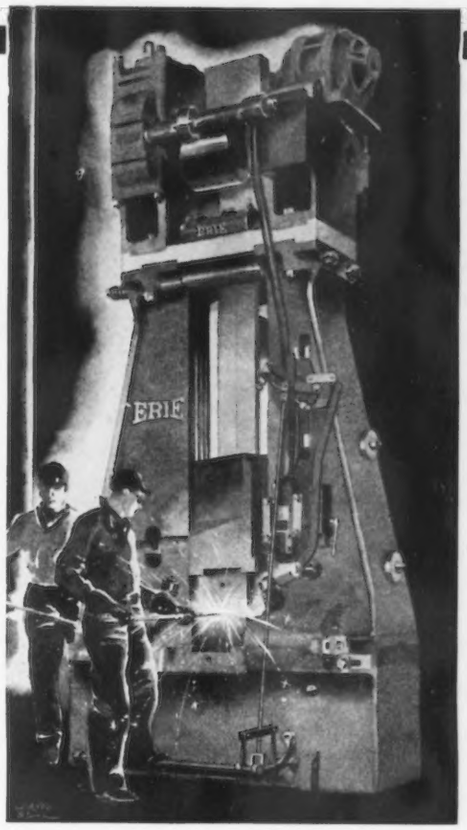
bonus, but it sponsored the $4,880,000,000 works relief bill, hailed as a vehicle to put 3,500,000 men to work, though New Dealers are the only ones who think it will even approach such an accomplishment.

Senate leaders frankly think the Patman bonus bill will go through the upper branch of Congress but with a smaller majority than it went through the house. They hope, therefore, that the confidently expected Presidential veto can be sustained in the Senate. There is no certaintly that this can be done, however. The tremendous lobby for the bonus has frightened Congress to its marrow, assuming it has any bone to contain marrow. The political ranting that only Wall street is against the Patman bill no doubt also has given it support that might otherwise be missing.

Administration forces and Congress generally steer clear of taxation. It is a deadly fly in the political ointment on the eve of another political campaign. But the move is more or less quietly under way. Not so quietly, however, but that the Chamber of Commerce of the United States has issued to business and industry a warning sign of more taxes. The knowledge was not exclusive on the part of the chamber, for President Roosevelt, at a news conference last Friday, repeated a statement he frequently has made to the effect that money appropriated in excess of budget estimates must be raised by taxation. Many are convinced that even if appropriations did not exceed budget estimates the latter, tremendous as they were, would inevitably mean higher taxes. This is contrary to the administration view, but the inflationary action if carried through, will mean enormous sums in excess of budget estimates. It will have to mean higher taxes. It will inevitably mean higher cost of living to a people who already are groaning under rising costs.

The success of weird legislation now getting through Congress, enacted and forthcoming, is of course due in large degree to the apathy of the public generally. Extremely lively and even threatening demands of persistent lobbies reflect small minority views but make a fearsome noise to politicians in Congress, regardless of party affiliations.

The Law Compels You To Pay for This Hammer



Is the ERIE Type M motor driven board drop hammer at work in your forge shop? If not—if you are making your drop forgings on antiquated hammers—you are paying for this hammer, paying in repair and maintenance costs, in low production and loss of production, in increased labor cost.

The ERIE Type M will more than earn its way in any shop, and if it is not working for you, you are paying for it nevertheless, compelled to pay by the inexorable laws of obsolesence and competition which are not subject to review by any Supreme Court.

Let these hammers work for you; get what you are paying for. Write us for complete information on the sizes in which you are interested.

ERIE FOUNDRY COMPANY, ERIE, PENNA., U. S. A.

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PARIS, FRANCE: 8 RUE DE ROCROY

ERIE

NIRB Reorganization Adds New Members

(CONTINUED FROM PAGE 48)

by "a member similarly representative of the industrial point of view." Mr. Richberg, the President stated, was appointed "for a period prior to the passage of legislation now pending before the Congress for the extension of Title I of the National Industrial Recovery Act." Blackwell Smith, acting head of the NRA legal division, and Leon Henderson, chairman of the NRA Research and Planning Board, will remain as ex-officio members of the NIRB.

"HERCULES" RED-STRAND
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Furnished in Flattened Strand, Round Strand, Preformed, Steel Clad and Non-Rotating constructions.

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A. Leschen & Sons Rope Co.
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CHICAGO
DENVER
SAN FRANCISCO

Steel Workers Protest Wagner Bill

(CONTINUED FROM PAGE 51)

Whether such methods have the approval and sanction of the labor leaders in Washington is beside the point. I personally know they are used by professional organizers in the field.

"The provision in Paragraph C, Section 10, that 'in any such proceeding the rules of evidence prevailing in courts of law or equity shall not be controlling,' seems to be particularly vicious. This can be construed to mean that the board could act upon hearsay evidence, affidavits, unsubstantiated statements, rumors, gossip, etc., and call them evidence on which findings of fact could be made. Such a procedure would violate every concept of fairness and justice, and would be a return to the Dark Ages."

Would Add Amendment

Speaking as attorney for the American Rolling Mill Co., Robert F. Caldwell called attention to the fact that the employee representation plan of that company is not a compulsory majority rule plan but permits a minority or an individual to take up adjustments with the managemert. Mr. Caldwell asked if the bill protected an employee from coercion. Senator Wagner said it did and Mr. Caldwell said it appeared that this policy was more restrictive than the title of the bill. He said there is no provision that an employee may coerce, which, it was pointed out, should be necessary to reconcile the bill with the title providing for full freedom of action in collective bargaining. Senator Wagner said an amendment would correct the situation.

Objection was made by Mr. Caldwell to a section of the bill by which it was suggested outside interests, without any representation in a plant, can lodge a complaint. Senator Walsh agreed that there should be no such right, but Senator Wagner said he could not accept such a restriction because he said the question would be decided by the proposed board. Mr. Caldwell said he was approaching the question in an orderly way and that he saw no reason why the bill should go off on a tangent and develop litigation. He objected also to the power of the proposed board whose decisions would be final unless the court of appeals found the board procedure or its evidence to be wrong.

He also said he thought the language of the bill was entirely too broad where it provides for abolition of a labor organization which is given financial or other support by a company.

Mr. Caldwell also suggested that when the board supervises an election it ought to provide a specific period during which the resulting status should remain in effect. Senator Wagner agreed with this suggestion. The witness said that secret balloting should be provided for in the bill and again Senator Wagner was in agreement. It was suggested also that reasonable notice should be given for hearings on complaints. The bill provides for only three days' notice.

Other Employees Heard

Martin Murphy, speaking for the employees of the Youngstown mills of the Republic Steel Corpn., said that in June, 1933, 93.2 per cent of the approximate force of 6000 at the Youngstown plant voted for an employee representation plan for the purpose of collective bargaining. He said the plan is a good and sufficient means of collective bargaining and that, as chairman of the group, he was opposed to any legislation "which would interfere with our present satisfactory method of collective bargaining under the employee representation plan."

Albert Crew, spokesman for the employee representation group at the Sparrows Point, Md., plant of the Bethlehem Steel Corpn., told Senator Tydings, of Maryland, that he was afraid the bill would disturb the relationship between the employees and the company.

Guy E. Mitchell, representing the employees of the Wheeling Steel Corpn., Steubenville, Ohio, was questioned sharply by Senator Wagner. The Senator demanded to know what provisions of the bill were objectionable. Mr. Mitchell said he understood the bill would abolish so-called "company unions." Senator Walsh then explained that if it does not already make it plain, the bill will be so revised as to permit freely organized groups such as employees want. Like other representatives, Mr. Mitchell objected to interference from the outside and asked that nothing be done by Congress to set in motion an agency that would abolish existing employee representative organizations.

Max Mursch spoke for the Etna, Pa., plant of Spang Chalfont & Co., Inc.; R. F. Colley, for the Butler, Pa., plant of the American Rolling Mill Co.; William R. Westlake, for the Aliquippa, Pa., plant of the Jones & Laughlin Steel Corpn.; W. B. Hadden, for the Vandergrift, Pa., plant of the American Sheet & Tin Plate Co.; Earl W. Jenkins, for the Youngstown plant of the Carnegie Steel Co.; and Louis E. Hart for the Chicago plant of the Acme Steel Co.

J. & L. Reduces Loss In 1934

THE Jones & Laughlin Steel Corpn., Pittsburgh, and subsidiary companies, had 1934 loss, after operating expenses, reserves and interest, of $3,670,672, compared with total loss of $5,807,351 in 1933. Loss in the fourth quarter of 1934 amounted to $806,173, compared with loss of $626,418 in the final quarter of 1933.

Film Shows Lathe Developments

AN industrial film entitled "The Development of the Lathe" has been produced by the Monarch Machine Tool Co., Sidney, Ohio, for use by technical societies, industrial organizations and schools. It pictures the original tree or pole lathe dating about 500 A.D., the first wood screw cutting lathe, the first iron lathe, the first quick-change gear lathe and the first geared head lathe. Monarch machines shown in operation include the Monarch-Keller form turning machine equipped with centrode device and oval chuck; the new Magna-Matic all-electric full automatic double-carriage lathe; engine lathes and the company's precision hand-feed surface grinder. The films are available in both 16 and 35-mm. sizes.

The annual meeting of the Electric Metal Makers Guild will be held at the Hotel Pritchard, Huntington, W. Va., April 12 and 13. Technical sessions have been arranged and the subjects for discussion are as follows: Absorption of hydrogen furnaces in stainless steel; arc vs. induction welding; stainless steel melting; aluminum in tool steels and stainless iron; slags; manganese steel, and nickel or chrome-nickel bearing metals.

Hardening of cast iron will be discussed at the April 1 meeting of the Montreal chapter of the American Society for Metals, to be held at the Windsor Hotel. J. S. Vanick, development department, International Nickel Co., New York, will discuss the relative merits of casting against chills, cyaniding, nitriding, heat treating and alloying, and also outline recent developments in these processes and describe commercial applications.

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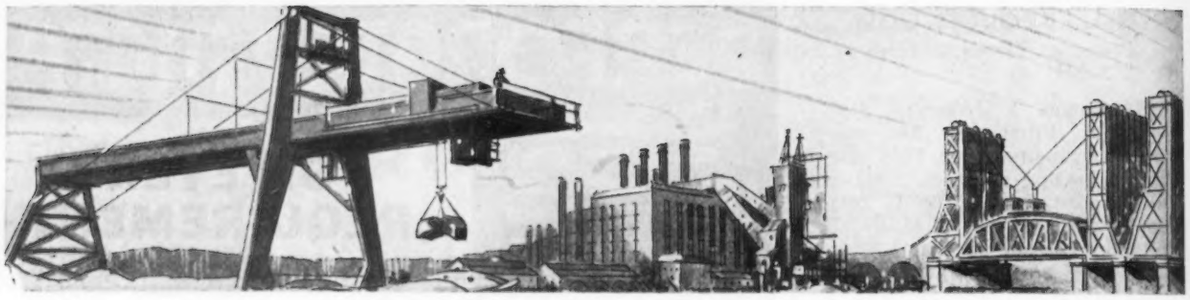
Editor's Note: This is a series of observations which, strangely enough, are exactly what they purport to be. In other words, they come from the daily diary of a real boss; a prominent executive in the metal-working industry who prefers to remain an anonymous author.

The Boss's Diary

"They say", "He said", "She said", "What do you know?", "Oh, I just heard." With some 120,000,000 people in these here United States, there are probably 119,000,000 silly, slithering, stinging, sloppy remarks opened with these introductions daily. The needless hurt of them! The empty vacuity of them! The inability to call them back!

I heard an ordination sermon some years ago. The good preacher told the candidate for Holy Orders that a good minister must be like a lightning rod. He must receive a lot and let it run right down into the ground and disappear. What would happen if some of these groups that are always springing National Weeks on us would create a "National Lightning Rod Week" in which 120,000,000 people would pledge themselves for one solid week to let every deleterious remark that came to their ears run down into the ground and disappear? We might be dumb but we'd be a lot happier.



Plant Expansion and Equipment Buying

Politics Postpones Huge Machine Replacement Demand

POLITICAL uncertainties have apparently again cast a wet blanket over machine tool demand, following two months of reassuring activity. The present let-up, however, has not dimmed the optimism with which the ultimate outlook is regarded, since the report of MAPI, which disclosed a potential demand for machine replacement in excess of 18 billion dollars.

Cincinnati is now operating at approximately 25 per cent of capacity on machine tools and other districts at equivalent levels. Electro-Motive Corpn. of Chicago has placed orders with Cleveland Crane & Engineering Co. for one 200-ton and two 40-ton and two 20-ton electric cranes and a 20-ton gantry. Other equipment to be purchased by this Diesel motor making subsidiary of General Motors will consist of machine tools, welders, enameling furnaces, presses, brakes and shears aggregating $280,000.

NORTH ATLANTIC

Texas Co., 135 East Forty-second Street, New York, is considering expansion and improvements at oil refinery at Port Arthur, Tex., including new production units, storage and distribution facilities with steel tanks and other equipment, pipe lines, etc. Cost over $2,000,000.

Penn-Maryland Corpn., 120 Broadway, New York, a subsidiary of National Distillers Products Co., same address, plans rebuilding liquor rectifying plant at Peoria, Ill., recently destroyed by fire. Loss over $150,000 with equipment.

Bushey Fuel Oil Carburetor Co., Inc., New York, has been organized by Eli J. Bushey, 184 West Eighty-second Street, New York, and William B. Hall, 110-35 Occident Street, Forest Hills, L. I., to manufacture fuel oil carburetors and parts.

Pullman Co., 52 Vanderbilt Avenue, New York, headquarters at Chicago, has let general contract to Barney Ahlers Construction Co., 110 West Fortieth Street, New York, for two-story and basement mechanical laundry, 130 x 200 ft., on site recently acquired at Long Island City. Cost about $100,000 with machinery.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until April 2 for 1444 oxygen cylinders and 996 closing valves for such cylinders (Schedule 4573); until April 5, 350 platform skids reinforced with steel, steel legs (Schedule 4548) for Brooklyn Navy Yard; until April 4, 20,800 lb. rough-machined steel forgings, each for Brooklyn and Philadelphia yards (Schedule 4574); until April 9, boiler water gages, spare parts and tools for Brooklyn and Philadelphia yards (Schedule 4584).

Como Mines Co., 111 Broadway, New York, has plans for new mining and refining plant at gold-mining properties near Dayton, Nev., including ore-crushing plant and other buildings. Cost over $200,000 with machinery. Archer E. Wheeler is metallurgical engineer.

Superintendent of Lighthouses, St. George, Staten Island, New York, asks bids until April 3 for lighted acetylene bell buoy body, lighted whistle buoy with whistle and whistle valve, and for two fixed counterweight bell buoys (Proposal 48295).

Commanding Officer, Watervliet Arsenal, Watervliet, N. Y., asks bids until April 1 for steel castings (Circular 58).

Quartermaster, West Point, N. Y., asks bids until April 1 for chain link wire fencing, complete with line posts, top rails, truss braces, post caps and arms, barbed wire, etc. (Circular 102).

Wilson-Jones Co., South Elmora Avenue, Elizabeth, N. J., manufacturer of loose-leaf paper products and allied commercial paper goods, has let general contract to White Construction Co., 95 Madison Avenue, New York, for addition to paper converting plant to double present capacity. Cost over $150,000 with equipment. Headquarters are at Chicago.

Clemco, Inc., Newark, N. J., recently organized by Elliott Clemence, Newark, and associates, to manufacture electrical equipment and novelties, has leased about 12,000 sq. ft. floor space in building at Bieglow Street and Frelinghuysen Avenue, for new plant.

Ocean City Engine & Yacht Co., Ocean City, N. J., has been organized by Robert K. Bell, Ocean City, and associates, capital $125,000, to manufacture marine engines and parts, and operate a boat-building and repair works.

Gem Mfg. Co., 2148 North Second Street, Philadelphia, manufacturer of refrigerators, parts, etc., has acquired two-story factory at Collins and Sergeant Streets, for new plant.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until April 2 for drilling machines (Schedules 4555, 4557, 4577, 4578), one precision jig-borer (Schedule 4566), one bevel gear generating machine (Schedule 4569), one sensitive drilling machine (Schedule 4572), one straightening press (Schedule 4570), 14 bench-type electric grinders (Schedule 4571), all motor driven, for Philadelphia Navy Yard.

R. Hutchinson, Inc., 93 James Street, Woodbridge, N. J., has been incorporated to manufacture astronomical and scientific instruments, and not brass, bronze and aluminum castings, as recently reported.

WESTERN PA. DIST.

Union Carbide & Carbon Corpn., South Charleston, W. Va., plans new buildings and installation of equipment in local plant. Company is also considering extensions in works at Alloy, in same vicinity, with installation of electric furnaces and other equipment. Work will be carried out in connection with 1935 development program at different properties of company, for which fund of $15,775,000 is being arranged. Headquarters are in New York.

City Council, Meadville, Pa., is considering new municipal electric light and power plant. Cost over $100,000 with equipment. R. L. Phillips, city engineer, will be in charge of surveys and preliminary plans.

W. M. Ritter Lumber Co., 115 East Rich Street, Columbus, Ohio, plans development of coal-mining properties near Pineville, W. Va., with new all-steel tipple, hoisting, loading and other facilities. Cost about $65,000. Virginian Railroad will build line to mining site.

SOUTH ATLANTIC

Department of Public Works, Winston-Salem, N. C., Harry L. Shaner, commissioner, has asked bids on general contract for new municipal abattoir, with conveying, loading, packing and other abattoir machinery, high-pressure boiler and accessories, refrigerating machinery, etc. Harold Macklin, Reynolds Building, is architect.

Barger-Ashe Roofing Co., Lenoir, N. C., has been organized by Ray C. Barger and J. B. Ashe, Lenoir, to operate a sheet metal works for production of roofing and kindred specialties.

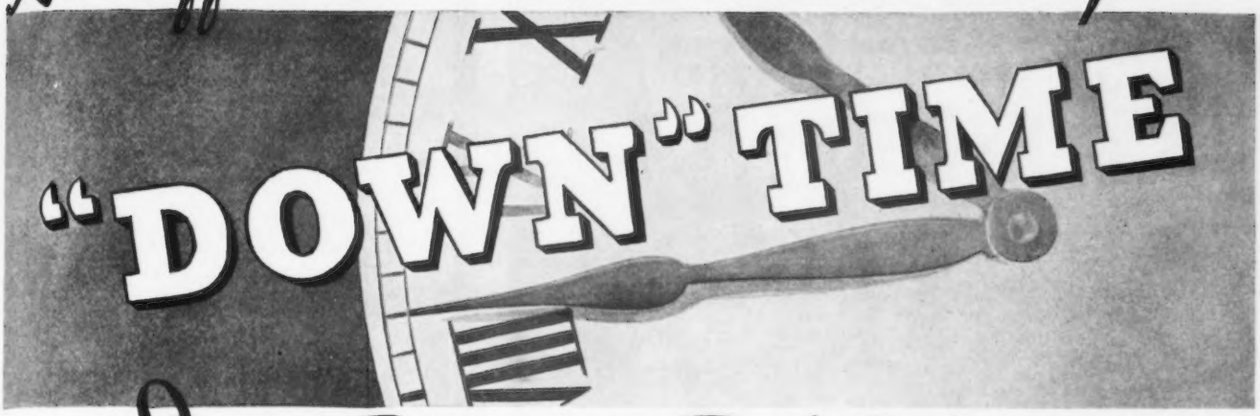
Charles H. Harvey, Hotel Seneca, St. Petersburg, Fla., is at head of project to erect a food products canning plant, with cold storage and refrigerating plant adjoining. Cost over $35,000 with equipment. Inquiries are being made for machinery.

Ocean Steamship Co., Savannah, Ga., affiliated with Central of Georgia Railway, Atlanta, Ga., plans rebuilding warehouse terminal and distributing plant recently destroyed by fire, including conveying, loading and other mechanical-handling equipment. Loss over $400,000.

BUFFALO DISTRICT

Eastman Kodak Co., Kodak Park, Rochester, N. Y., has let general contract to

An Effective Aid in Combatting "DOWN" TIME ...Due to Frequent Tool Resharpening



EQUIPMENT idle ... production time lost ... while tools that dull too rapidly are being changed!

That's a condition every shop executive is seeking to avoid, because operating delays are *costly.*

To help prolong intervals between tool regrinds, we suggest the effectiveness of Sunoco Emulsifying Cutting Oil. Its long service record shows *outstanding* performance. Results are seen in longer runs per tool grind, less lost time for resetting—and reduced tool maintenance costs.

Machine Tool Efficiency is Higher with SUNOCO

With Sunoco, machine tools achieve smooth and chatterless operation, greater accuracy, greater output and fewer rejects. Not without good reasons has this cutting oil been adopted so widely in the industry!

Faster Grinding without Increased Wheel Wear

In grinding, Sunoco makes possible faster stock removal without increasing wheel wear and yet reduces to a minimum the danger of burning the work. Even at high surface speeds, abrasive wheels stay cool.

Sunoco can be used over and over again without oxidizing or developing obnoxious odors.

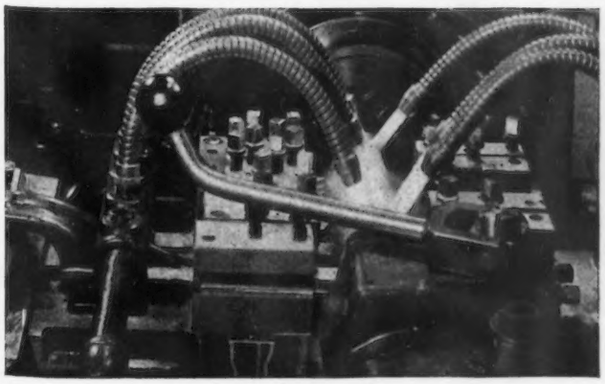
Operation: Machining wheel end of automobile axle shaft.
Machine: Monarch "Magnetic" Lathe.
Lubricant: 1 part Sunoco to 15 parts of water.

Courtesy of
Monarch Machine Tool Co.
Sidney, Ohio

SUNOCO
EMULSIFYING
CUTTING OIL

Operation: Grinding differential pinions.
Material: Chrome-nickel steel.
Machine: Bryant Hole Grinder.
Coolant: 1 part Sunoco to 40 parts of water.

Courtesy of
Buck & Hickman, Ltd.
London, England



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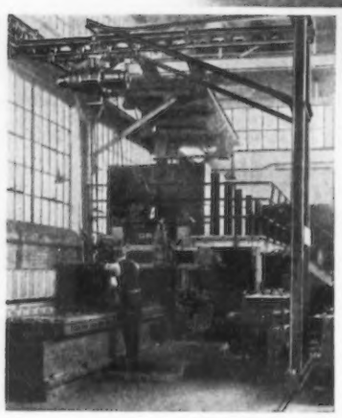
TRANSPORTATION of MATERIALS OVERHEAD With CLEVELAND TRAMRAIL

INCREASE PRODUCTION BY REDUCING IDLE MACHINE TIME



Cleveland Tramrail

GANTRY CRANES and hand propelled CARRIERS with Motor Operated hoists are just one of the many combinations of standard equipment, highly efficient, for this faster servicing of processing machinery.

SOME production and processing machines can turn out finished parts faster than present methods of transportation can move these parts to their next place of need. The value of some production tools has been questioned because of this lack.

Therefore, a faster method of moving materials and semi-finished parts to and from these machines is the solution to *this problem* of getting full returns on the investment in machine tools.

Consult your 'phone directory under "Cleveland Tramrail."

CLEVELAND TRAMRAIL

Hand or Electric Overhead Materials Transportation Equipment

DIVISION OF
THE CLEVELAND CRANE & ENGINEERING CO.
WICKLIFFE OHIO

Ridge Construction Co., Rochester, for multi-story plant addition. Cost over $350,000 with equipment.

Geneva Foundry Corpn., Geneva, N. Y., manufacturer of iron and other metal castings, plans rebuilding part of plant recently destroyed by fire. Loss about $50,000 with equipment.

Complete Oil Equipment & Service Co., Buffalo, has been organized by Ira W. Smith, 15 Tennyson Avenue, and Raymond A. Williams, 18 East Depew Avenue, to manufacture tanks, vats, boilers and other oil containers and equipment.

Bison Canning Co., Angola, N. Y., food products, has plans for new two-story canning plant, 40 x 75 ft. Cost about $30,000 with equipment. W. L. Schulenberg, Fredonia, N. Y., is engineer.

Iron Fireman Mfg. Co. of Canada, Ltd., 602 King Street, West, Toronto, manufacturer of automatic coal burners and parts, stokers, etc., has leased about 11,000 sq. ft., in building noted, for expansion, doubling former floor area. Company is a subsidiary of Iron Fireman Mfg. Co., Portland, Ore.

NEW ENGLAND

Remington-Rand, Inc., Bridgeport, Conn., manufacturer of adding and calculating machines, parts, etc., plans one-story and basement addition, 80 x 300 ft. Cost over $75,000 with equipment. Headquarters are at 205 East Forty-second Street, New York.

United Shoe Machinery Corpn., 140 Federal Street, Boston, manufacturer of automatic shoe-making and repair machinery, is negotiating for purchase of former plant of Ipswich Mills, Inc., Ipswich, Mass., totaling about 200,000 sq. ft. floor space, for expansion.

Board of Selectmen, Marblehead, Mass., plans manual training department in new three-story and basement junior and senior high school. Appropriation of $425,000 has been authorized. J. W. Vose is superintendent of schools. W. H. Quiner, 75 Pleasant Street, is architect.

McCorkindale Co., Inc., Holyoke, Mass., has been organized by William P. McCorkindale, Granby Road, South Hadley, Mass., and associates, to manufacture machinery and mechanical appliances.

Board of Selectmen, Sterling, Mass., will soon take bids for pumping machinery and accessories, elevated tank and tower, pipe lines, etc., for municipal waterworks. Fay, Spofford & Thorndike, 44 School Street, Boston, are consulting engineers.

SOUTH CENTRAL

Birmingham Stove & Range Co., Tennessee Pike and Twenty-seventh Avenue, North, Birmingham, manufacturer of stoves, ranges, parts, etc., has plans for one-story enameling unit. Cost over $25,000 with equipment.

Smith Packing Co., 530 Third Street, North, Nashville, Tenn., recently organized to take over Smith, Crittenden & Co., food packers and canners, address noted, has let general contract to Sumner Construction Co., 418 First Street, North, for one-story addition. Cost close to $50,000 with equipment. Carl F. Schloemann, 6329 San Bonita Street, St. Louis, is consulting engineer.

Board of Commissioners, Port of New Orleans, New Orleans, asks bids until April 12 for 50,000-gal. steel water tank to replace present wood tank at warehouse No. 2 on waterfront.

Gulf Refining Co., Columbia, Tenn., is planning to rebuild part of bulk oil plant recently destroyed by fire. Loss close to $30,000 with equipment.

Board of Education, Nashville, Tenn., plans manual training department in new multi-story junior and senior high school. Cost about $235,000. C. K. Colley, American National Bank Building, is architect.

OHIO AND INDIANA

Central Steel & Wire Co., 1095 East Monument Avenue, Dayton, Ohio, manufacturer of steel, brass, copper and other wire specialties, has filed plans for one-story addition. Cost close to $25,000 with equipment. Headquarters are at 4545 South Western Avenue, Chicago.

Diesel Power Engineering School, Cleveland, recently organized, has leased about 10,000 sq. ft. in three-story industrial building at 1120 Central Avenue, S. E., for new mechanical instruction school, in-

A new ALADDIN'S LAMP

In production welding, manufacturers are finding a servant as capable and versatile as the genie in Aladdin's magic lamp. It fulfills their three most important wishes—to improve the product, increase production and lower costs.

To production welding few things are impossible. It has been applied with remarkable success to products that range from small jewelry and toys to massive grave vaults and automobile bodies. With the aid of automatic feeds it turns out small units as fast as 60 a minute, and welds on the heaviest products seldom take more than a minute. Cost is perhaps its biggest advantage, for resistance welding not only joins metals faster and better, but it is usually much cheaper than any other method.

May we show you how this modern production method will give you more and better units at lower cost? As manufacturers of a *complete* line of production welding equipment, we can help you develop the one best machine or method for your production requirements.

THOMSON-GIBB ELECTRIC WELDING COMPANY

THOMSON PRODUCTION WELDERS GIBB

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cluding testing, repair and other equipment.

Hudepohl Brewing Co., 40 East McMicken Avenue, Cincinnati, has acquired at bankrupt sale former plant of Sohn Brewing Co., Sixth and Stone Streets, and will modernize for branch brewery. Cost over $60,000 with machinery.

City Council, East Palestine, Ohio, has authorized fund of $47,000 for extensions and improvements in municipal electric light and power plant, and will take bids at once for 500-hp. watertube boiler with superheater, soot blowers, feed water regulator and accessories; mechanical stoker and other equipment. Herbert Lemley is safety-service director, in charge.

Material Division, Air Corps, Wright Field, Dayton, Ohio, asks bids until April 1 for 2000 universal joint assemblies (Circular 599), rivets and washers (Circular 577); until April 2, two engine ring cowling assemblies (Circular 600); until April 4, 30 landing gear axle assemblies (Circular 589); until April 5, 266 generator assemblies (Circular 566); until April 8, two segregator assemblies (Circular 574); until April 12, bolts, nuts, screws, taper pins, lock washers and plain washers (Circular 585); until April 16, drain cocks, shut-off cocks, brass nipples and air nozzles (Circular 593).

Carthage Distilling Corpn., 7818 Anthony Wayne Avenue, Cincinnati, has let general contract to Frank Messer & Sons, Inc., 2515 Burnet Avenue, for three and five-story and basement addition, for a liquor rectifying unit. Cost over $90,000 with equipment.

Bowdil Co., Bowdil, Stark County, Ohio, manufacturer of coal-mining machinery and allied equipment, has acquired former plant of Dayton Malleable Iron Co., Canton, Ohio, and will remodel for branch plant.

Walsh Distilling Co., Lawrenceburg, Ind., has plans for five-story addition, part of unit to be used for distillery and remainder for storage and distribution. Cost over $85,000 with equipment.

WASHINGTON DIST.

German Brewing Co., Cumberland, Md., has plans for new multi-story plant unit, to be equipped as a stock house and for other operating service. Cost about $75,000 with equipment.

Procurement Officer, Chemical Warfare Service, Edgewood Arsenal, Md., asks bids until April 2 for one triplex pump, one hydraulic accumulator, one heavy action trip and one hydraulic pressure gage (Circular 112).

General Purchasing Officer, Panama Canal, Washington, asks bids until April 2 for steel machine bolts, steel carriage bolts, steel nuts, copper-nickel alloy nuts, steel foundry nails, cast iron ogee washers, water pipe bends, six warehouse barrel trucks, storage batteries and other equipment (Schedule 3042).

Sherwood Distilling & Distributing Co., 212 East Lombard Street, Baltimore, is planning new distillery near Westminster, Md., including storage and distributing division. Cost over $65,000 with equipment.

Board of District Commissioners, District Building, Washington, asks bids until April 3 for 36,000 steel sheets, 12⅝ x 62 in.; until April 9, new pumping plant for sewage disposal works at Blue Plains, D. C., including grit chambers, etc. Cost over $100,000.

Maryland Meter Co., Inc., 309 East Saratoga Avenue, Baltimore, manufacturer of gas meters and parts, regulators, etc., has asked bids on general contract for one-story addition and improvements in present factory. Cost over $30,000 with equipment. Herman F. Doelman, 516 North Charles Street, is consulting engineer.

SOUTHWEST

Department of Public Works, City Hall, Kansas City, Mo., M. S. Murray, director, will soon take bids for transformers and other electrical equipment for municipal auditorium, to cost about $63,000, and for similar equipment for general city hospital, cost about $27,000. Robert Waddell is city engineer.

City Council, Frederick, Okla., is arranging special election in April to approve bonds for $125,000 for new municipal electric light and power plant, using Diesel engine-generator units. V. V. Long & Co., Colcord Building, Oklahoma City, Okla., are consulting engineers.

Terminal Oil Co., 5 East Frisco Street, Oklahoma City, Okla., has let general contract to Charles Moreau Construction Co., Huckins Hotel Building, for new bulk oil storage and distributing plant, with main unit 40 x 100 ft. Cost about $30,000 with steel tanks and equipment.

Southern Ice & Utility Co., 615 Thomas Street, Little Rock, Ark., plans rebuilding part of No. 1 plant recently destroyed by fire. Loss over $100,000 with machinery.

State Highway Department, Austin, Tex., Gibb Gilchrist, engineer, let general contract to E. B. Snead, Austin, for new one-story equipment storage and distribution and repair shop. Cost about $100,000 with equipment. Adams & Adams, Insurance Building, San Antonio, Tex., are architects.

Pump Rod, Swivel & Joint Specialty Co., Dallas, Tex., has been organized by C. A. Boyd and W. R. James, 5223 Bradford Drive, to manufacture pumping machinery and kindred equipment and parts.

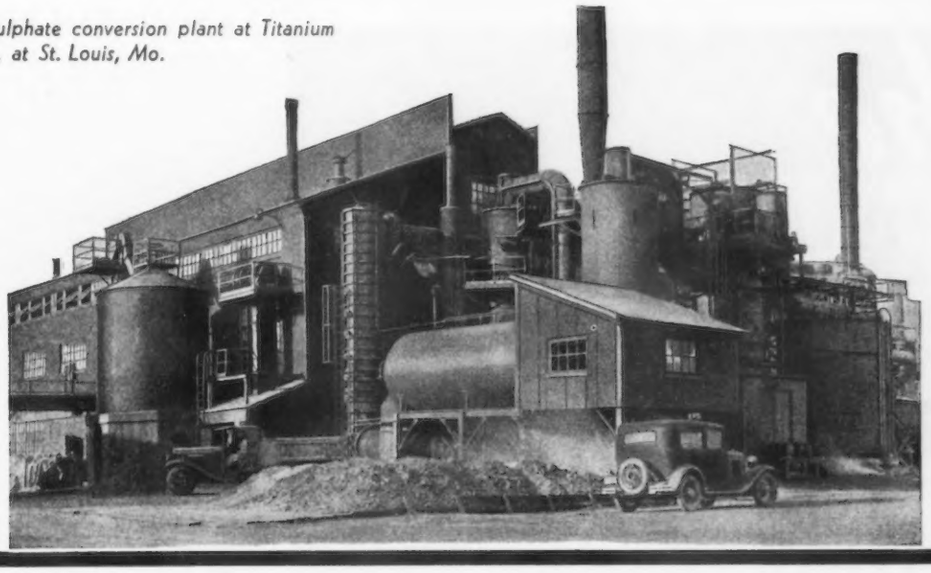
Austin Concrete Works, Inc., Austin, Tex., plans expansion, with installation of additional equipment for production of reinforced-concrete pipe.

MIDDLE WEST

Fleischmann Malting Co., 327 South La Salle Street, Chicago, has let general contract to E. W. Sproul Construction Co., 2001 West Pershing Road, for five-story addition, 100 x 212 ft., at malt works. Cost $300,000 with equipment. L. E. Peterson is company architect.

Royal Metal Mfg. Co., 1140 South Michigan Avenue, Chicago, manufacturer of

Chemico ferrous-sulphate conversion plant at Titanium Pigment Co., Ltd., at St. Louis, Mo.



SPENT PICKLING LIQUORS ARE VALUABLE!

—if you utilize the sulphur content by converting it into acid. This can now be done with additional benefits.

THE first large commercial plant (shown above) for making sulphuric acid direct from waste iron sulphate solution is now in steady operation, and is so successful that its owner has a second plant of the same capacity under construction.

Plants of this type are particularly desirable for treating spent liquors from pickling tanks in the steel industry. Through utilization of the sulphur content from these otherwise worthless liquors, and conversion into clear sulphuric acid of any desired strength—all in one small group of simple equipment—this new Chemico process makes acid recovery highly desirable and in addition converts the iron sulphate into iron oxide. By making the plant slightly larger, fresh acid may also be produced in sufficient quantity for make-up.

As a means of economical acid recovery and production alone, these plants pay an attractive return, including the value of the iron oxide. Also important is the complete elimination of the disposal problem involving pollution of streams with accompanying risk to public relations.

Our Engineering Executives are internationally known specialists in their respective lines, and we have originated and commercialized many improved and super-successful chemical processes. We guarantee performance of every undertaking and ask acceptance of the finished plant only after proven operating satisfaction. The plant is delivered with working crew trained and equipment operating at capacity.

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STEEL SHEETS
THE NEWPORT ROLLING MILL CO., NEWPORT, KY.

metal chairs and other metal furniture, has leased space in building at 91 Church Street, Toronto, for new branch assembling and finishing plant for Canadian trade.

W. & B. Air Tite Seal Cap Mfg. Corpn., 752 Oakwood Boulevard, Chicago, has been organized by Samuel B. Wolf and Lawrence C. R. Bursch, to manufacture metal caps, bottle seals, etc.

City Council, La Porte City, Iowa, has engaged Young & Stanley, Inc., Muscatine, Iowa, consulting engineer, to prepare plans for new municipal electric light and power plant. Cost about $100,000 with equipment. Bids will be asked soon.

Zoller Brewing Co., Davenport, Iowa, has let general contract to Alfred A. Smith, Penobscot Building, Detroit, for addition. Cost about $40,000 with equipment.

Wallace Mfg. Co., Minneapolis, has been organized by Wallace J. Schulz and H. H. Morrill, 3017 Alabama Avenue, St. Louis Park, Minn., to manufacture electrical equipment and devices.

Kleinschmidt Laboratories, Inc., 222 West North Bank Drive, Chicago, manufacturer of electrical products, has plans for new one-story plant, 74 x 74 ft., Highland Park. Cost close to $25,000 with equipment. Mayo & Mayo Architects, Inc., 1 North La Salle Street, is architect.

Northern Pacific Railroad Co., Railroad Building, St. Paul, Minn., has approved plans for remodeling former boiler shop at Missoula, Mont., 32 x 190 ft., for new motor truck and motor bus service, repair and garage unit, including machine shop. Cost about $40,000 with equipment. O. M. Rognan, first noted address, is company architect.

MICHIGAN DISTRICT

Bundy Tubing Co., 10951 Hern Avenue, Detroit, manufacturer of brass, copper and steel tubing, has plans for one-story addition. Cost over $25,000 with equipment. Harry Angell is company architect.

Ford Motor Co., Dearborn, Mich., plans expansion and modernization in sheet glass manufacturing plant at River Rouge, inactive since 1932, for production of laminated safety sheet glass under continuous process. Melting furnaces, annealing furnaces, grinding and polishing machinery and other mechanical equipment will be installed. Cost about $3,000,000 with machinery.

Chevrolet Motor Co., 3044 West Grand Boulevard, Detroit, has plans for one-story addition to press building, 160 x 200 ft. Cost over $125,000 with equipment. Albert Kahn, Inc., New Center Building, is architect and engineer.

Dalzen Tool & Mfg. Co., 2421 Smith Street, Hamtramck, Mich., has been organized by Peter Collins, 13735 Corbett Avenue, and associates, to manufacture tools, dies and kindred mechanical equipment.

Independent Brewing Co., 7411 Central Avenue, Detroit, is planning early resumption of work on new plant, discontinued several weeks ago through failure of general contractor to carry out agreement. New units will include main brewery, bottling works, storage and distributing building and other structures. Cost over $90,000 with equipment.

PACIFIC COAST

Bureau of Reclamation, Denver, asks bids until April 12 for four 4-motor cage-operated, overhead revolving cranes for intake towers at Boulder Dam power plant, Boulder Canyon Project, California-Arizona-Nevada (Specification 617); until April 15, 12 86-in. dia. emergency gates, complete with hoists, motors, limit switches, conduit linings and accessories for same power project (Specification 620).

Reilley Brewing Co., Salt Lake City, Utah, care of C. H. Reilley, president, Salt Lake City, recently organized, plans new brew-house, mechanical bottling works, storage and distributing buildings, power house, machine shop and miscellaneous units. Cost over $200,000 with equipment.

Board of Education, Long Beach, Cal., has asked bids on general contract for new one-story vocational training shop, 81 x 143 ft., and administration building, 70 x 143 ft., at John Dewey junior high school. Cost about $150,000. Victor E. Siebert and Verne D. Hedden, 120 East Third Street, are architect and mechanical engineer respectively.

Santa Clara Pear Packers Association, Santa Clara, Cal., has plans for two-story packing plant, 72 x 138 ft. Cost about $45,000 with conveying, loading and other mechanical equipment. Ellison & Russell, Pacific Building, San Francisco, are engineers.

United States Engineer Office, Portland, asks bids until April 5 for two 60,000-hp. clockwise turbine units, with accessories, for Bonneville Navigation and Power Project, near Bonneville, Ore. (Circular 513).

Crown Importers, Inc., 777 Thomas Street, Seattle, has plans for remodeling one-story building, 60 x 120 ft., with installation of equipment for new liquor rectifying plant. Cost about $30,000 with machinery. William R. Grant, Seaboard Building, is architect.

Martin Leiser, 2267 N. W. Pettygrove Street, Portland, has let general contract to Reimers & Jolivette, Railway Exchange Building, for one-story machine shop at 2402 N. W. Twenty-second Place. Cost about $21,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until April 5 for four Diesel engine-driven generator units and spare parts for Mare Island Navy Yard (Schedule 4598).

FOREIGN

British Burma Petroleum Co., Ltd., Johannesburg, South Africa, has plans for new oil refinery, with storage and distributing department, including steel tanks, pumping machinery and other equipment. Cost about $450,000 with machinery.

One of six hundred and nine panels recently fabricated for the walkway of the Cincinnati-Covington Bridge. Aluminum channels spot-welded to corrugated aluminum sheet. 118,052 spots! Many structural parts of this bridge are being replaced with aluminum to get increased load carrying ability.

SPOT WELDING HAS ARRIVED!

Another way to manufacture better and cheaper with Aluminum

● Recent developments in resistance-welding equipment now make it possible to put spot-welding of aluminum on a production basis, and to get the consistent strength, speed, good appearance, and economy that are commonly associated with this technique.

These developments in standard equipment are based on long research, which has shown conclusively that uniformly satisfactory results come from precision control of the variables in the welding process.

The proper duration of power application for any gauge has been predetermined. Impulses of the desired number of cycles are now obtained, without variation, by means of electronic timing devices. Pressure, too, is accurately controlled and easily adjusted to proper values.

Precision control is accomplished, on this new equipment, with no sacrifice in operating speeds.

We have been privileged to help in the design of this equipment, now offered by well-known manufacturers. And we shall consider it a privilege to help you take full advantage of these new developments. Address, ALUMINUM COMPANY OF AMERICA, 1885 Gulf Building, Pittsburgh, Pa.

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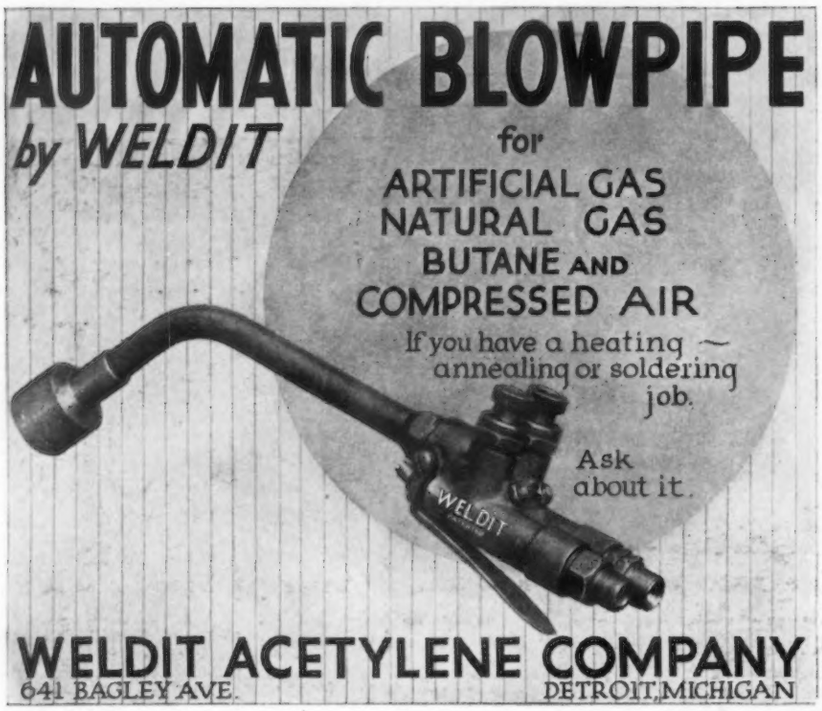

Huge Keller Automatic Cuts Dies For Auto Body Stampings

(CONTINUED FROM PAGE 31)

new machine there are only three stations at which control mechanism has been concentrated. The separate control cabinet has been entirely eliminated and most of its mechanism concentrated in the head of the machine. The remaining electrical parts formerly in the cabinet have been grouped with the magnetic gear box mounted on the back of the column. The third group of electrical equipment is incorporated in the saddle in connection with the transverse magnetic gear box.

The external wiring has also been greatly simplified. One large cable extends from a terminal board on the head to another terminal board on the saddle. A second cable extends from the saddle to a terminal board on the back of the column. In these two cables is concentrated all the necessary external wiring other than the main power and light inputs into the machine. If for any reason it becomes necessary to replace any of this external wiring these cables may be entirely removed and new cables, assembled at the factory, substituted for them. As no wires need be pulled through the interior of the machine, the arrangement simplifies maintenance.

Operator Rides on Platform Attached to Saddle

A range of horizontal and vertical travels from 1½ to 100 in. per min., permits the machine to cut at maximum efficiency under all conditions. Speed control with minimum effort on the part of the operator is essential in a large machine of this type, and for this reason the design is such that the operator rides on a platform attached to the saddle of the machine. Thus, he can command any motion and make every necessary operating adjustment without leaving his position.

This ease of control is accomplished in a unique manner. Both the horizontal and vertical motions of the machine are driven from a magnetic gear box located on the rear of the column. A 3½ hp. adjustable-speed motor drives into this gear box, which, as shown in the illustration, contains two banks of magnetic clutches, four clutches in each bank. The upper four clutches are continuously driven by the motor, and are geared together so that each rotates at a speed approximately 2½ times the speed of the clutch at its right. The operator from his position at the head of the machine can energize any one of these four clutches and thereby select the one which will drive the lower bank of four clutches. In this lower bank, two clutches drive the horizontal motion of the machine to the left or to the right respectively, and two clutches drive the vertical motion, up or down. Energizing of the magnets may be accomplished by push button, or effected automatically when the machine is under tracer control. In this manner the machine will travel in any direction at any speed within its range, and a further adjustment of speed is possible by rheostat control of the gear box motor.

A similar magnetic gear box drives the transverse motion of the spindle head. In this case, however, there are two selective speed magnets driven by a 1 hp. adjustable-speed motor and a speed range of 3 to 36 in. per min. is provided.

Automatic Cycle Changed by Operator

Speeds can be predetermined by the operator when the machine is under tracer control. Where it is desired, for example, to cut in one direction only the machine can be set for an automatic cycle whereby it will cut at any selected normal rate of travel, will withdraw at the end of each stroke under rapid traverse, return to the starting position and then move in at a rapid rate and resume its cut on the next stroke, again at the normal cutting speed. This cycle will continue automatically until the entire surface of the job is covered.

From the magnetic gear box, power is transmitted to the vertical leadscrew through a shaft

he dictates Wire Specifications

. . . for CHAINS must be hard yet tough

Many wires will form easily in a chain machine, but the chain maker required more, a wire that would weld properly, tempered for strength and case harden to resist abrasion. Careful study of chain making and the condition of use of chains enabled us to give the chain maker what he wanted. You, too, have requirements that must dictate as to wire specifications if the wire you use is the best wire for your particular purpose. Wickwire Spencer engineers will similarly study your manufacture and product use and produce a wire for you based entirely upon your dictation as to specifications.

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Wickwire Spencer manufactures High and Low Carbon Wires—in various tempers, grades and finishes—for your specific purpose. Hard-Drawn, soft or annealed Basic or Bessemer Wires—Hard-Drawn annealed, or oil-tempered Spring Wire, Chrome Vanadium Spring Wire—Valve Spring—Music—Clip—Pin—Hairpin—Hook and Eye—Broom—Stapling—Bookbinding—Machinery Spring Wire—Reed Wire—Clock—Pinion—Needle-Bar—Screw Stock—Armature Binding—Brush—Card—Florist—Mattress—Shaped—Rope—Welding. Flat Wire and Strip Steel, High or Low Carbon—Hard, annealed or tempered—Clock Spring Steel—Corrosion and Heat Resisting Wires. Consult the Wissco technical man on your wire problems, however large or small.

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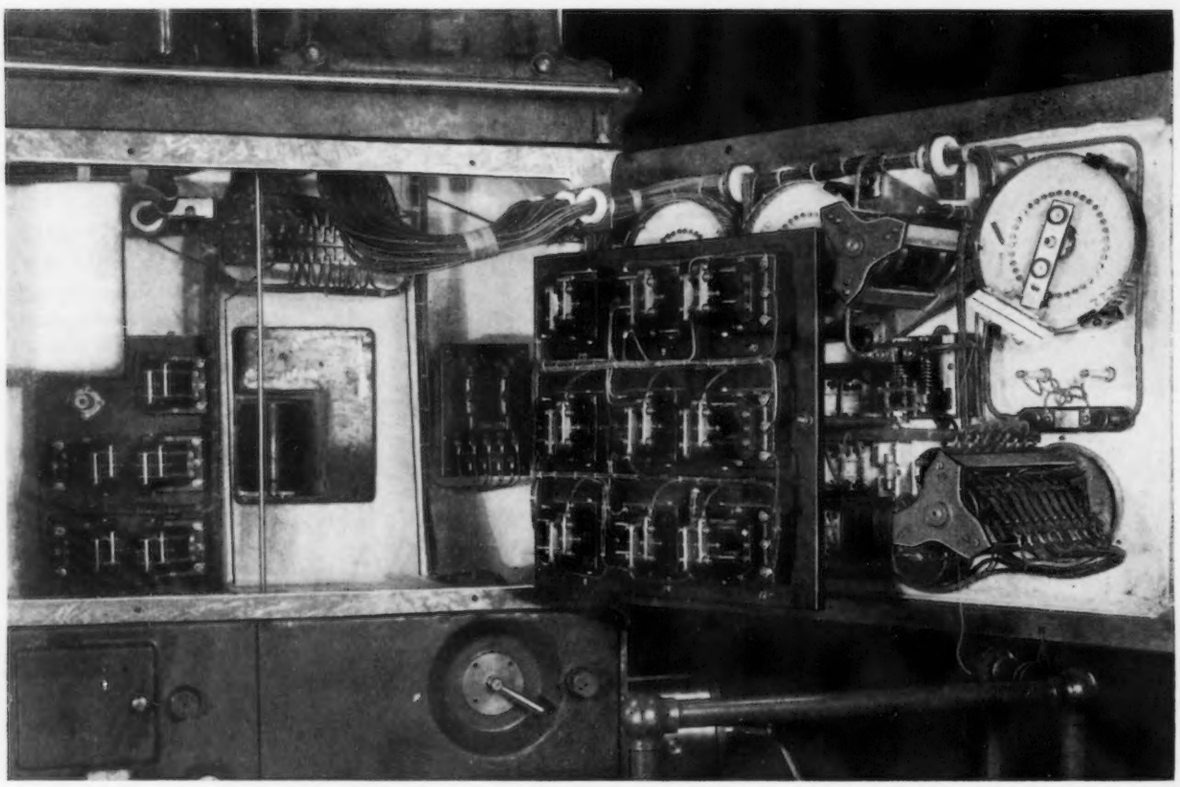
and bevel gears, the shaft extending through the column base. Another shaft from the gear box drives a rotating nut for horizontal movement. The horizontal leadscrew is stationary and lies in a trough in the center of the bed. It is constantly immersed in oil. The other leadscrews are also lubricated automatically.

Bed ways are always covered by telescoping guards and platforms. At times it is difficult, therefore, for the operator to know whether the machine actually is in motion. For this reason two indicators have been provided to show him the direction and speed of the horizontal and vertical motions of the machine.

Automatic force feed lubrication of all bearing surfaces is arranged in a novel manner. A Bijur pump and storage tank are provided for each movement of the machine. Each pump is operated by a magnet which takes electrical impulses from a cam geared to the movement of the slide. The impulses are proportional, therefore, to the movement of each slide, and the distribution of oil is liberal when there is considerable motion of the slide and is limited when the need is slight.

The system of rocker gibbing adopted for this machine is new. Each gib is made of steel and is hardened, ground and lapped. It is carried on an eccentric stud and



PART of the control panel and the connections inside the head of the machine are shown in this detail view. The three rheostats for adjusting the speed of the spindle-drive motor, horizontal and vertical drive motor and the transverse drive motor may be seen at the upper right. The automatic feed control whereby the machine may be set to travel up to the limit of power is also shown. The drum switch may be seen at the lower right-hand corner of the panel. A second panel, which opens independently of the exterior control panel, carries most of the relays necessary for the control of the machine. The oil-sight and pressure gages of the automatic lubricating system for the transverse slide may be seen at the extreme lower left hand.

Lee Wilson invented, developed, perfected and patented the Tube Type Annealing Furnace.

They are sold exclusively by the Lee Wilson Engineering Co. and The Wean Engineering Co., Inc. No other company has been given the right to manufacture or sell them in the United States or Canada.

The Wilson Annealing Unit is covered by Patent No. 1952402 and other Patents Pending.

This Triple "A" Annealing Unit will produce GREATER TONNAGE with a HIGHER QUALITY at a LOWER COST.

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MUSIC WIRE
Drawn from highest grade SWEDISH ROD
Catch weight coils . . . exact weight coils . . . spools or straightened and cut . . . tinned or special rust proof.
Laboratory control of all processes insures uniform quality.
LARGE STOCK CARRIED IN DETROIT WAREHOUSE—1501 BEARD ST.
NEW ENGLAND HIGH-CARBON WIRE CO.
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is self-adjusting in all directions. At the other end of each eccentric stud is a pinion engaging a small rack. The racks are held in position by set screws and may be adjusted easily to take up wear in the slides or gibs. The self-adjusting feature of this system of gibbing is emphasized as assuring the full bearing of gibs at all times, and keeping the machine solidly in alinement.

Six-Ton Counterweight Has Extra Safeguard

A 12,000 lb. counterweight inclosed in the column and connected to the head by two roller chains is used on this machine. Although these chains are of more than ample capacity to hold the counterweight, an extra safeguard is provided in the form of a coarse pitch screw which runs vertically through the counterweight and is driven by the vertical leadscrew. A nut in the counterweight just clears the screw at all times; but should the chain break, the counterweight would settle on the safety screw before the weight could gain enough momentum to do any damage. This feature is also an advantage in dismounting the vertical leadscrew or the head if necessary. The safety screw can be turned so that it bears the burden of the counterweight and then the head can be handled without difficulty.

Chip disposal, a problem in a large machine of this type, is met by means of a trough placed between the bed and table of the machine. A motor-driven screw conveyor mounted in this trough moves the chips continuously toward one end of the bed, where they are dropped on another conveyor that takes them to a receptacle which may be emptied at intervals. Cutter coolant also drains into the chip trough. It flows over a series of baffles to a trough that extends along the front of the machine. From this trough the coolant is drawn by a motor-driven pump up through piping in the column to be used again.

The greatly increased range of this machine and the high mounting of the tracer above the cutter spindle necessitated developing a special tracer adjusting mechanism. Vertical transverse slides are provided whereby the tracer can be raised and lowered 32 in. and moved in and out the same amount to permit making use of the full operating range.

Late Returns from Laboratory and Mill

(CONTINUED FROM PAGE 24)

4, 1934, and the principal sponsor of the process in this country is the Pyrene Mfg. Co., Newark, N. J. Mr. Eckelmann of that company will soon publish a fully illustrated article on the present status of the process in THE IRON AGE.

In his original patent specifications, Herr Schlotter gives two typical baths for electrolytic deposition of the bright nickel. These are (1) nickel sulphate = 160 grams, nickel benzoldisulphonate = 30 grams, boric acid = 30 grams, and sufficient water to give a *pH* value of 2.5 to 4.5; (2) nickel chloride = 160 grams, nickel naphthalenetrisulphonate = 30 grams, boric acid = 30 grams, and water sufficient to give a *pH* value of 2.5 to 4.5. It is understood that other nickel salts may be used as electrolytes and that other aromatic poly-sulphonates may be employed and the proper acidity may be obtained by other acids than boric acid.

Using these baths a deposit of nickel has very small crystals, equal to or less than 0.0001 mm. in diameter. It is this small crystal size that gives the plate such a high polish or luster.

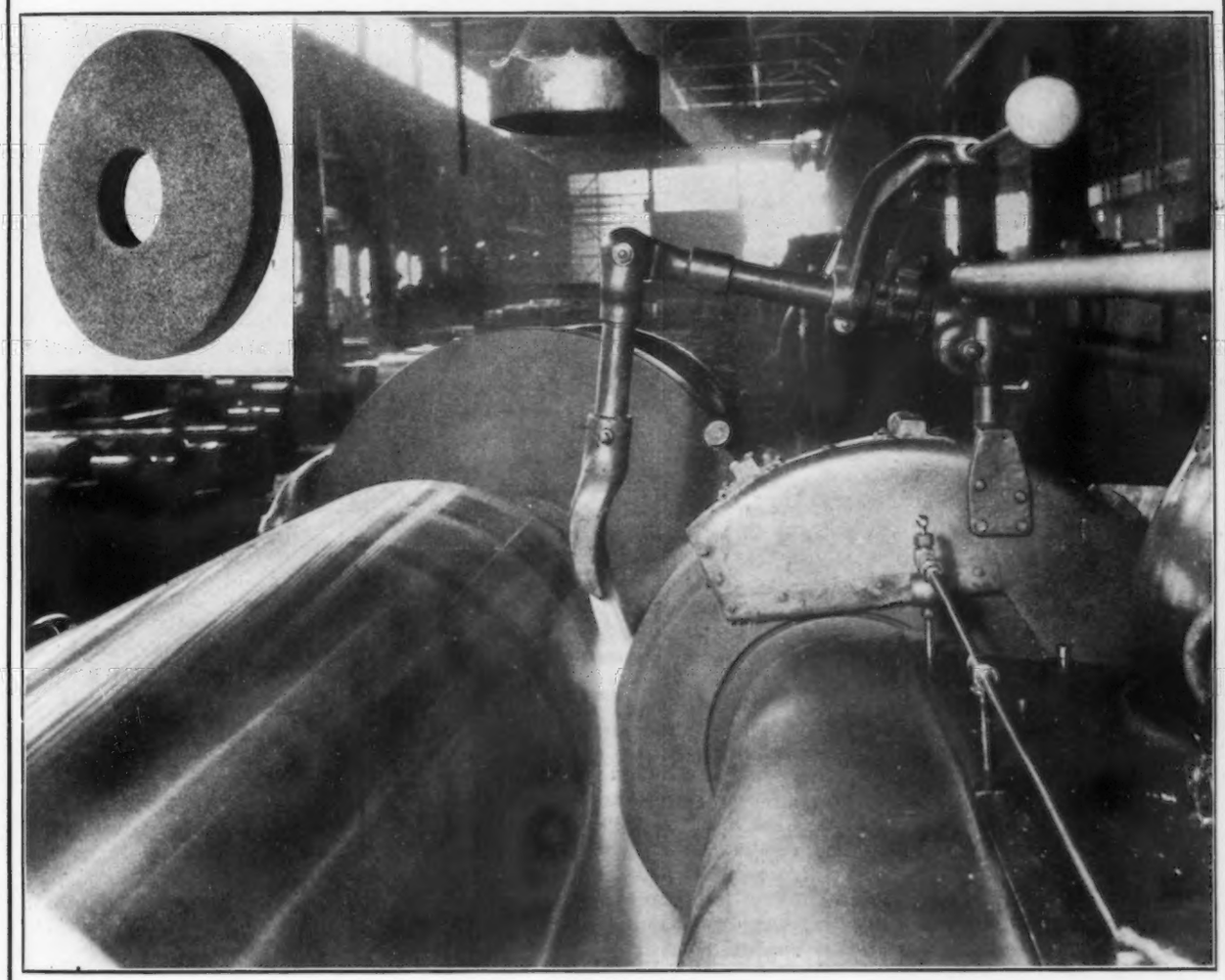
The action of the calloids is, in a sense, mechanical in interfering with the building up of larger crystals due to the electrodeposition by kataphoresis on the deposit and thus breaking the continuity of the crystals. The new method gives small crystals which have an inherent high gloss and high resistance to abrasion and to penetration and corrosion.

Bright plates, in thicknesses of about 0.005 in. and above, are not always as ductile as those obtained from some of the standard type baths. However, the ductility is high enough for most requirements. The base must be thoroughly cleaned, as imperfections and scratches will show through deposits of less than 0.001 in. On satin-finished base metal, deposits over 0.0005 in. have great depth

MACKLIN

ROLL GRINDING

WHEELS



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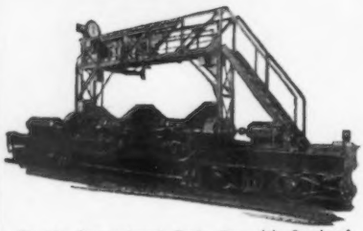
ATLAS CARS



Double Compartment Scale Car with Overhead Operator's Platform. Car provided with Orr Bin Gate Operating Mechanism.

20 Ton Capacity Double Compartment Scale Car for use with Orr type Bin Gates controlled from Operator's Station on Scale Car.

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Special Cars and Electrically Operated Cars for every conceivable purpose.

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and brilliance and do not readily mark on handling.

* * *

Correct Ramming of Furnace Linings

THE British Cast Iron Research Association has just issued report No. 131 dealing with preferred techniques in ramming the linings of rotary furnaces. The review states that it is generally realized that it is necessary to insure uniformity of moisture content and thorough mixing of the material used in forming the refractory lining of a rotary furnace, but often insufficient attention is given to methods of securing a proper union of the successive layers of material used in building up the lining.

It is desirable to use a ramming tool with a somewhat chisel-shaped end which will force its way through one layer into the preceding layer and so bring about effective joining and union of the two. If a blunt-end ramming tool is used, the successive layers are not united and a laminated lining results. Such a defect is illustrated in Fig. 3. A lining of this character is quite likely to shell off or spall when the furnace is heated.

* * *

Hardness Measured Accurately With New French Machine

MOST standard procedures for measuring hardness are somewhat inflexible. That is, accurate results may be obtained in some cases when thick specimens are tested but wide variations appear when thin films are examined. The opposite condition likewise holds true for other machines. Consequently considerable attention is being given to a newly developed French machine which performs with satisfactory accuracy over a wide range of hardness even when these values are accompanied by great variations in specimen thicknesses.

This new machine is a large model of a much smaller instrument which had been used satisfactorily for measuring the hardness of cartridge cases. A diamond indenter is employed, and the load is applied by means of a balanced steelyard to the end of which various weights can be added. Variations in the load between 0 to 5 kg. are secured with a jockey weight which rides the steelyard.

The specimens are placed on a firm base and the diamond is brought in contact, after which the scales are set at zero. Weights are then added to the steelyard. The indentation is measured by an arrangement of the principle of the optical lever which indicates the extent of movement of the part carrying the indenter. There is a definite relation between the indentation and the weights added. Three scales are attached to the machine, and the diamond penetration in units of 0.001 mm. can be immediately translated into the Rockwell number, the Brinell number between 100 to 500 units or the Brinell number between 20 to 40 units.

The total indentation of the diamond may be as small as 0.1 mm. The machine is capable of measuring the hardness of thick or thin objects or deposits of very thin layers. In Fig. 4 is shown the close conformity of actual indentation of the machine to the theoretical depth, which was secured mathematically. In this case the ball used was 1.2 mm. in diameter and the load was 42.2 kg. Numerous experiments with this machine in measuring the hardness of carburized steel as a function of the penetration of cementation gave results apparently more accurate and more easily reproduced than when a Rockwell machine was used.

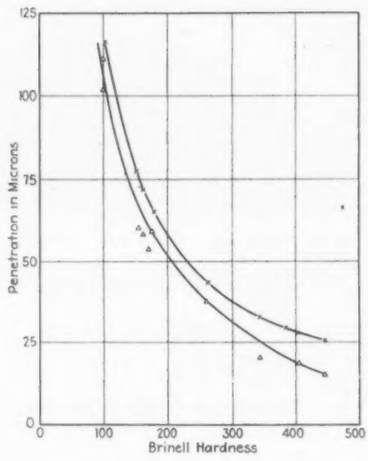

FIG. 4—Penetrations obtained with a new French hardness tester conform closely to theoretical figures. Upper curve gives the theoretical penetration data; the lower curve is the actual penetration obtained on a series of standard-gage blocks. Note that there is a slight systematic deviation above 300 Brinell

SHEETS - STRIPS

up to 72" wide

OUR NEW CONTINUOUS HOT MILL

now in operation provides you with a completely modern and dependable source of supply for hot rolled sheets and strips in the following gauges and widths.....

14 gauge to ½" inclusive up to 72" wide
15-16 gauge . . . up to 60" wide
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These are available in either cut lengths or in coils.

HOT ROLLED YOUNGSTOWN STRIP

HOT ROLLED YOUNGSTOWN SHEETS

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Manufacturers of Carbon and Alloy Steels

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Truly Modern
THREADING MACHINES

Murchey No. 11 Single Spindle Only.

Murchey No. 22 Double Head Only.

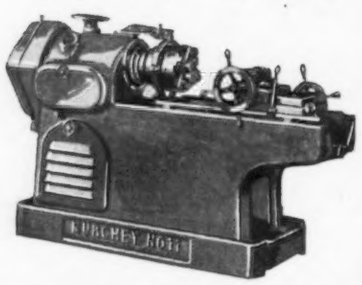
Circular Chaser Die Head in both Types.

Pre-loaded Roller Bearings throughout.

Motorized Machines; motor in bed of machine.

Speeds Adjustable between 72 and 386 R.P.M.

Lead Screws, optional.



Machines may be used for Pipe or Bolt Threading.

MURCHEY MACHINE & TOOL CO.
951 PORTER STREET DETROIT, MICHIGAN

TRADE PUBLICATIONS

Beryllium Copper.—American Brass Co., Waterbury, Conn. Well-illustrated, 20-page booklet devoted to the composition, forms, application, fabrication procedure and mechanical properties of Anaconda beryllium copper, a heat-treatable alloy having unusual physical properties.

Gears.—Meisel Press Mfg. Co., 944 Dorchester Avenue, Boston. Attractive brochure entitled "Gear Craftsmanship," with separate sections devoted to: "A Panorama of Historical Progress of a Gear Manufacturer; Ideas on Quality Gears; and the Technical Craftsmanship of Quality Gears." The last named is by S. A. Smith, manager of the company's gear division, and includes a number of diagrams of gear tooth action.

Pneumatic Tools.—Chicago Pneumatic Tool Co., 6 East Forty-fourth Street, New York. Publication SP-1876, devoted to "Power Vane" rotary tools, including drills, nut runners and tappers, wood borers, grinders, sanders and polishers, and wrenches. Specifications are given, and illustrations include large sectional views.

Precision Boring Machines.—Cimatool Co., Dayton, Ohio. Bulletin illustrating and describing universal, normal-duty, and heavy-duty models of Cimatool boring machines. The heavy-duty machine is a double-end unit weighing more than 5½ tons. Spindle and boring head construction is also pictured.

Chucks.—Skinner Chuck Co., New Britain, Conn. Bulletin No. 48, 16 pages, devoted to hand-operated independent, self-centering, and combination chucks; also drill chucks, air-operated chucks, and planer, shaper, drilling and milling machine vises. Dimensions and list prices are given.

Arc Welders. — General Electric Co., Schenectady, N. Y. Bulletin devoted to new type-WD arc welder, the various parts and principles of which are pictured and are described at length.

Welding Electrodes. — General Electric Co., Schenectady, N. Y. Characteristics of a number of different types of bare, lightly-fluxed and heavily-coated electrodes for both manual and automatic welding are described and their applications indicated. A section is devoted to electrode holders, glasses, helmets and hand shields and other welding accessories.

Bolts and Nuts.—Bayonne Bolt Corpn., Bayonne, N. J. Catalog No. 8, giving sizes, list prices and extras on a variety of bolt products. It is attractively printed and includes several pages of useful information. Prices on stainless steel, chrome iron and non-ferrous bolts and nuts, including those of Monel metal, and Dardelet lock thread products and special items may be had on application.

Hydraulic Accumulators.—Seamless Steel Equipment Corpn., 39 Broadway, New York. Bulletin illustrating and describing "Hydraulik" compressed air accumulators without pistons or floats and with no working parts in the interior. The entire control is actuated by the water level and not by pressure. An advantage is that its capacity can be increased by the addition of one or more water units and a corresponding number of air bottles. The company is representative in this country for hydraulic presses built by the Hydraulik Corpn. of Duisburg, Germany.

Pumps—F. E. Myers & Brothers Co., Ashland, Ohio. Complete 344-page catalog listing and illustrating pumps of various types for every purpose, including bulldozer power pumps, self oiling power pumps, centrifugal pumps, automatic water systems, spray pumps, sump pumps, power washers and other products. Much useful engineering data are included.

Hollow Drill Steel.—Bethlehem Steel Co., Bethlehem, Pa. Booklet describing manufacture, processing and application of company's hollow drill steel.

Enamels, Ferro Enamel Corpn., Cleveland. Booklet, listing, describing and illustrating work in the Ferro laboratories and explaining a field service conducted by company. Solutions are given of some of enameling problems that enameling plants referred to company.

Speed Reducers—Link-Belt Co., Chicago, is 20-page illustrated catalog No. 1515 devoted to newly developed line of motorized speed reducers, in which motor is mounted directly on side of reducer housing.

Paint—Sherwin-Williams Co., Cleveland. Attractive catalog entitled "Guide to Profit Through Paint," illustrating and describing the uses and advantages of paint in plant conditioning, including lighting, appearance and metal protection. Several pages are devoted to color schemes used in a food packing plant. A feature is a chart showing paints recommended for maintenance of building exteriors and interiors.

FINANCIAL NOTES

Westinghouse Electric & Mfg. Co. reported for 1934 net income of $189,562, compared with net loss of $8,636,841 for 1933. Sales billed for 1934 totaled $92,158,893, compared with $66,431,591 for 1933. Orders received totaled $106,473,226, against $72,473,117 in 1933, an increase of 47 per cent. Unfilled orders at the close of 1934 amounted to $34,085,921, compared with $26,954,044 at the close of 1933.

Otis Steel Co., Cleveland, had profits of $560,891 during 1934 as compared with a net loss of $1,509,528 in 1933. The 1934 profit was after deduction of $866,424 for depreciation, $716,820 for bond interest, $103,000 for Federal taxes and $184,119 for other charges.

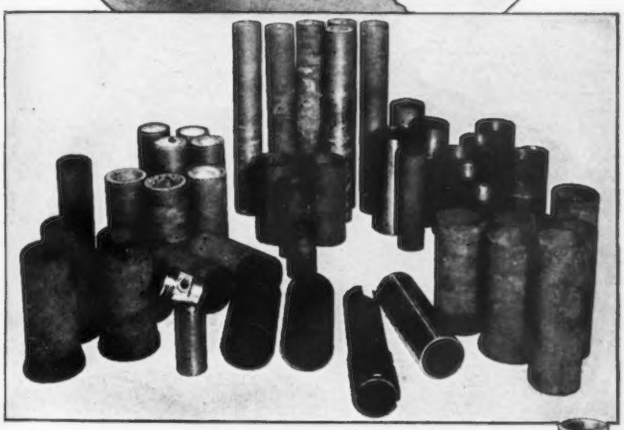
Granite City Steel Co. has net earnings of $258,761 on sales of $5,188,789 during 1934, against $506,502 and $6,278,663 respectively in 1933.

Wheeling Steel Corpn. and subsidiaries had 1934 net profit of $529,202, compared with net loss of $284,430 in 1933.

Spang, Chalfant & Co., Inc., and subsidiary, had 1934 net profit of $820,812, after depreciation, interest and Federal taxes, equal to $6.31 a share on the 6 per cent cumulative preferred stock. This compares with net loss of $910,692 in 1933.

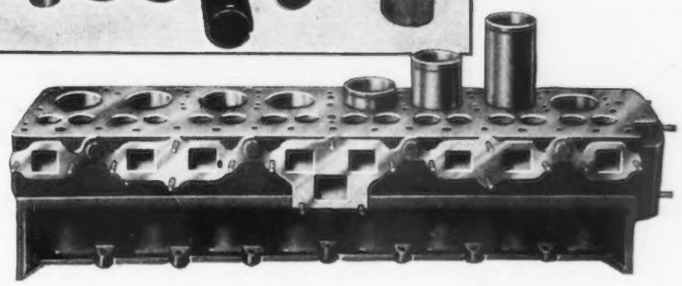
Pittsburgh Forgings Co. had net profit in 1934 of $31,040, compared with net loss of $73,781 in 1933. Earnings of Greenville Steel Car Co., a subsidiary, not included in the parent company's profits, were $164,330, compared with $4,781 in 1933.

Now sold IN THE U.S.A.



(above)
A group of rough and finished nitricastiron sleeves designed for various purposes.

(at right)
Showing how nitricastiron sleeves are inserted in a motor block.



Nitricastiron cast centrifugally can now be furnished by the Forging and Casting Corporation of Ferndale, Michigan. It has been manufactured and used in Europe with great success for several years. Outstanding uses are as liners for the cylinders of truck, bus and tractor motors and for Diesel engines.

Wherever there are cylindrical surfaces subjected to wear, Nitricastiron has no equal. Write us today for descriptive booklet, for information on its properties, application and handling.

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COMPOSITE STEEL DIES · TOOL STEEL CAST TO SHAPE · TOOL AND ALLOY STEEL FORGINGS · NITRICASTIRON CAST CENTRIFUGALLY

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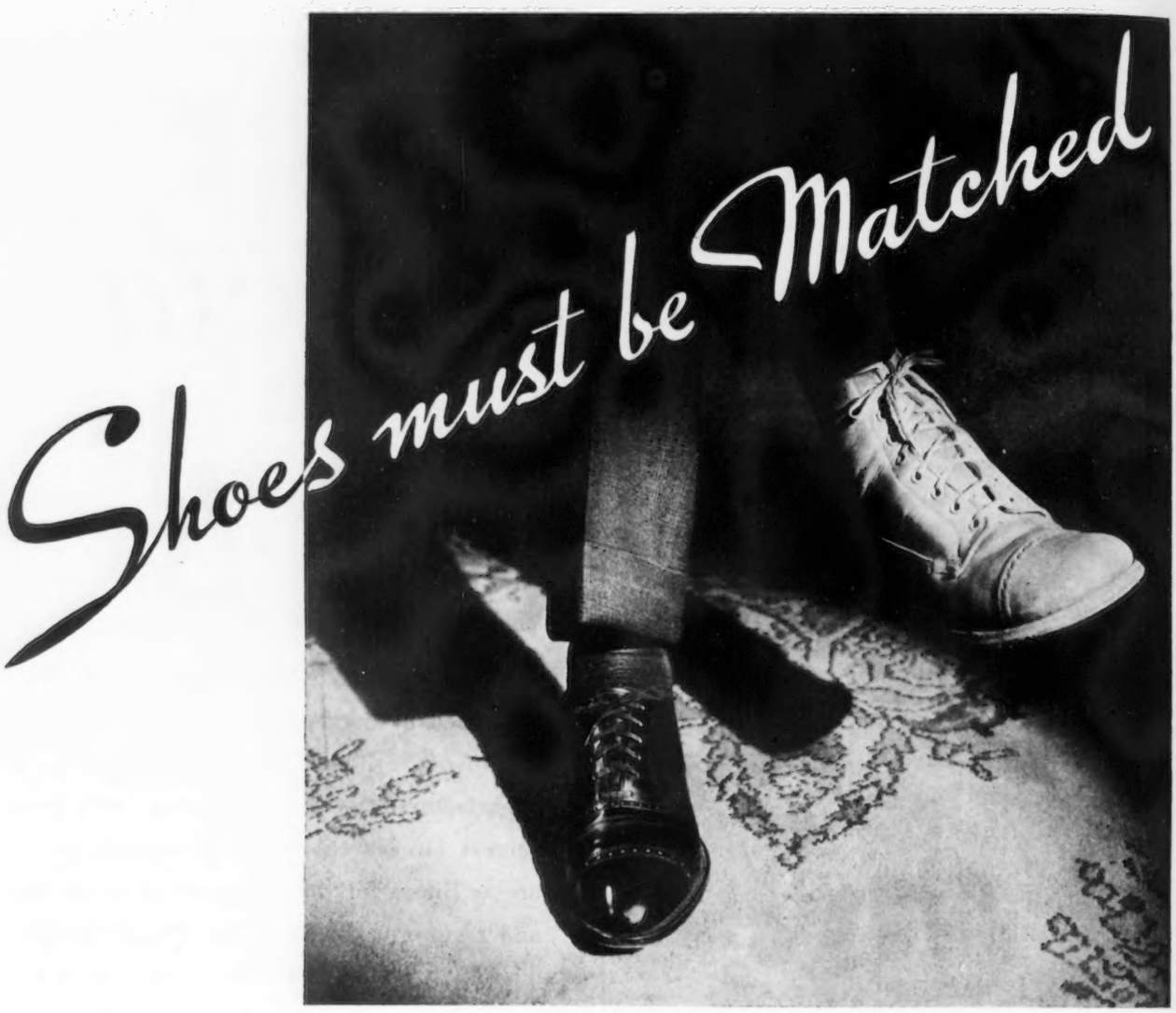
IA-3-28

THE IRON AGE, published every Thursday by the *CHILTON CO., (INC.)*, Chestnut & 56th Sts., Philadelphia, Pa. Entered as second class matter November 8, 1932, at the Post Office at Philadelphia under Act of March 3, 1879. $6.00 a year in U. S., Canada $8.50, Foreign $12.00. Vol. 135, No. 13.



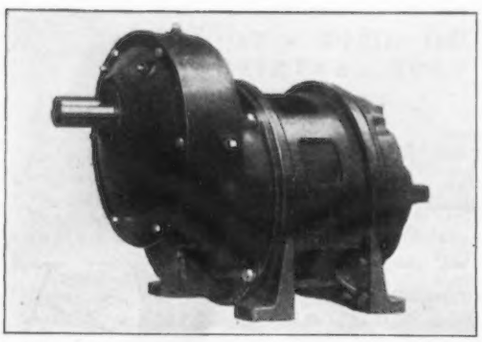
SO MUST THE MOTOR AND GEARS IN YOUR GEARMOTOR

● You wouldn't dream of purchasing shoes except in pairs. Shoes must be *matched* . . . and only the same manufacturer can make them so.

The component parts of gearmotors, too, must be matched—to each other, and to the jobs in your plant. One manufacturer should make both motor and gear unit, because he can thus coordinate rating, design, and manufacture for most efficient operation.

It's this unit rating, design and manufacture . . . we call it "Unitary Power" . . . which enables Westinghouse gearmotors to take loads up to the peak capacity of the motor. Power take-off by pulley, pinion, or sprocket, with diameters as small as twice that of the output shaft, can be used with the standard gearmotor. This practically eliminates the usual restrictions on overhung loads.

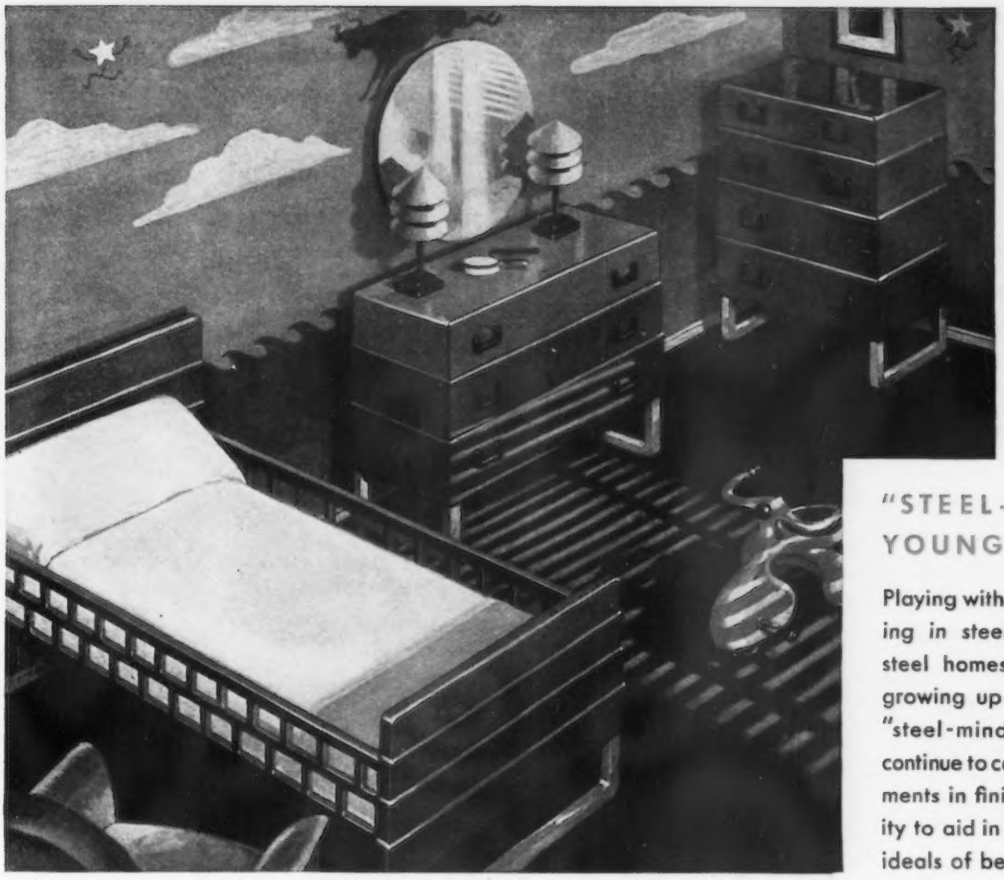
Standard Westinghouse gearmotors are available with general-purpose motors, or such modifications as splash-proof, totally-enclosed, or explosion-tested motors. For complete information, address Westinghouse Electric, Room 2-N, East Pittsburgh, Pa.



Westinghouse "Unitary Power" Gearmotors, with unit design, unit manufacture, unit rating, and unit responsibility, are available in sizes from ½ to 75 hp. and from 1550 to 15 rpm.

Westinghouse T 85036

Your Problems Solved With Inland Cold Rolled Sheets



"STEEL-MINDED" YOUNG AMERICA

Playing with steel toys, sleeping in steel beds, living in steel homes, Americans are growing up more and more "steel-minded". Inland will continue to contribute improvements in finish and workability to aid in carrying out new ideals of beauty and quality.

YOUR problems of finish, of draw and fabrication can be solved with Inland Cold Rolled Sheets. They are made in grades with characteristics meeting all requirements. Inland's advanced equipment and experience in making and applying sheet steel is at your service. INLAND STEEL COMPANY, 38 South Dearborn Street, Chicago, Illinois.

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Plates Structurals Piling

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IF IT HAS SKF, IT HAS

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SKF Spherical Roller Bearings perform beyond the fondest expectations of Globe engineers who specified them for 84 roll-necks and drive gears and pinions on this Foren type rolling mill. And they carry on every day with low-cost precision that means uniform product.

They're designed to obtain the compactness and greater capacity of the roller bearing, at the same time retaining the ball bearing's smoothness and low friction that leads to less sliding, less wear and heating, and longer life. They never need adjustment . . . run for long periods on one lubrication . . . and meet all demands for performance. So send up your profits by bringing your product up to the high standards of SKF! Merely specify SKF performance! SKF INDUSTRIES, INC., Front Street & Erie Avenue, Philadelphia, Pennsylvania.

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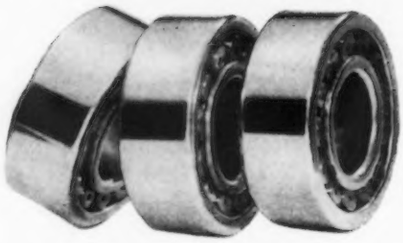
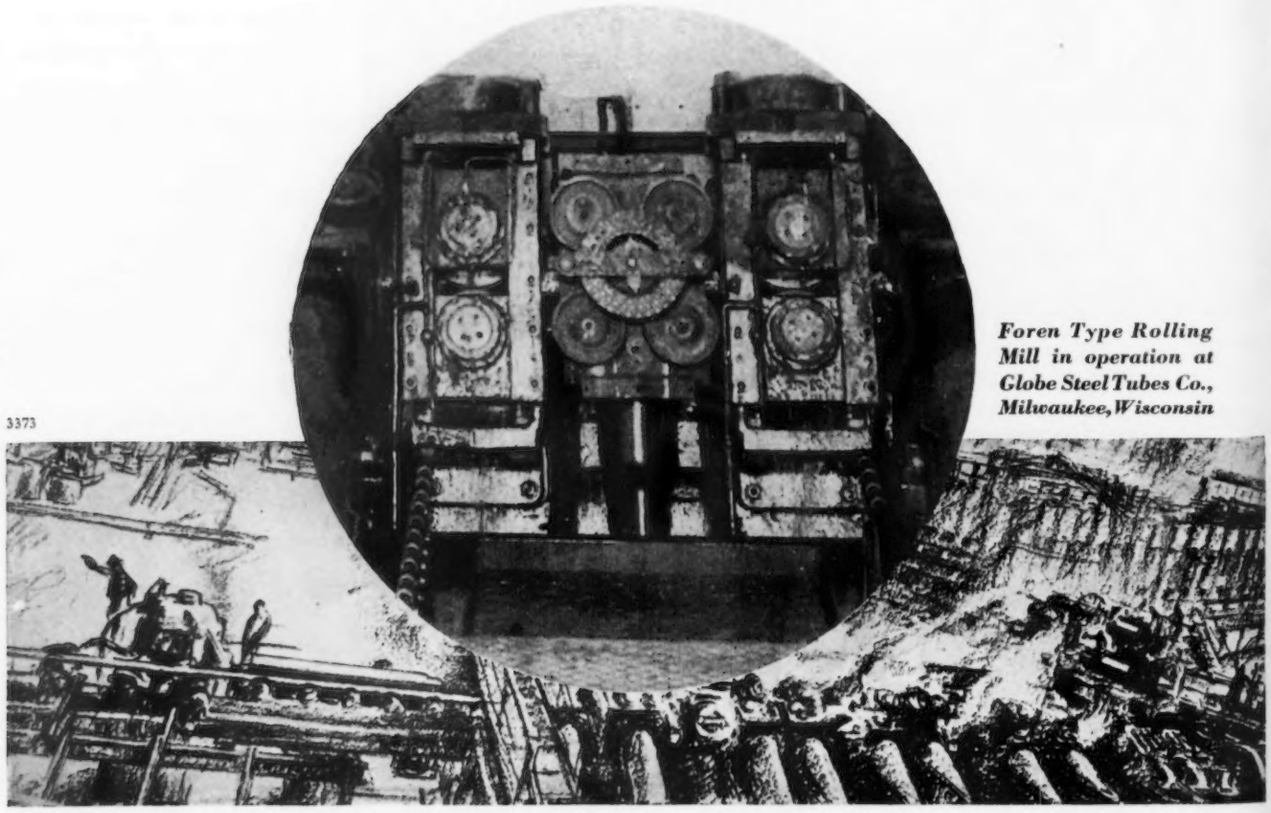


ROLLER BEARINGS



Foren Type Rolling Mill in operation at Globe Steel Tubes Co., Milwaukee, Wisconsin

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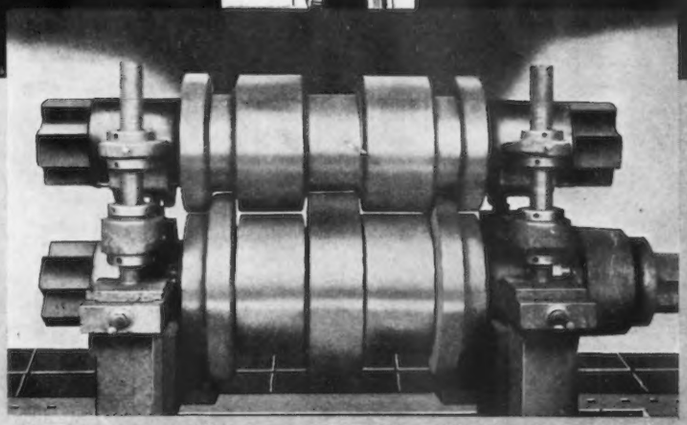
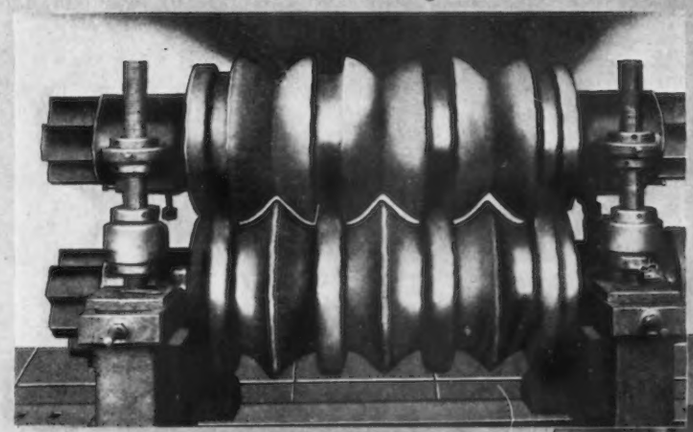
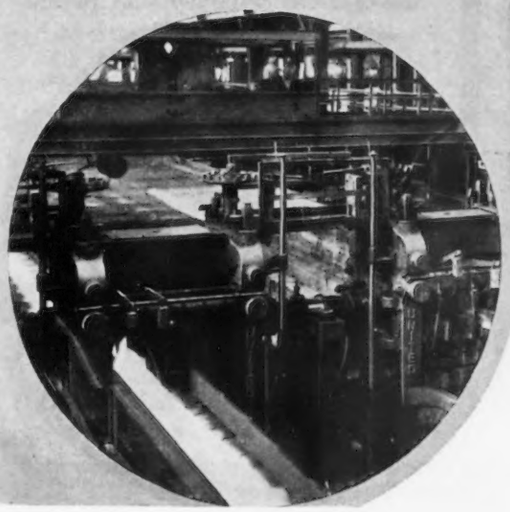
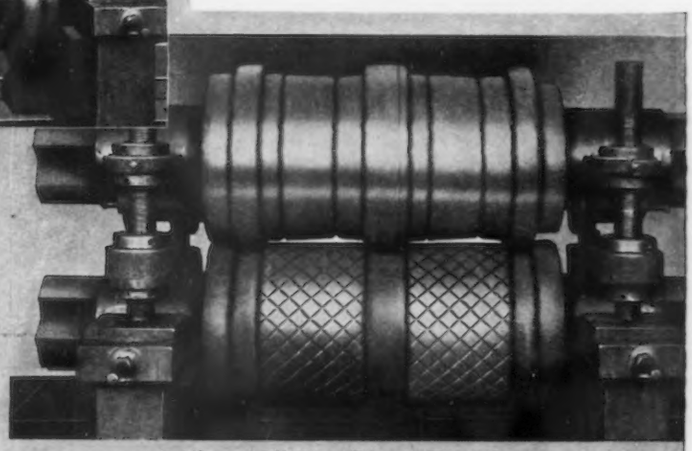


12" Beam Finishing Rolls



8" x 8" Angle Intermediate Rolls





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The expression "a roll for every mill" is not an idle one, and it has been the good fortune of **UNITED** to co-operate year after year in selecting for this mill or that one, the roll which performs better than the the rolls used in it before.

A large corps of trained and experienced engineers, a staff of skilled metallurgists and a force of trained roll men with roll shop experience are constantly maintained, and will be glad to co-operate in every possible way in effecting high-production and economy in rolling.

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Another dirty job licked by

RELIANCE SPLASH PROOF MOTORS

● Far beneath the earth's surface the Chicago Water Tunnel is in the making. There in dampness, with rocks, stone, dirt and wet concrete falling on them, Reliance fully-protected splash-proof motors, with their water-proof insulation, are giving phenomenal service.

Numerous similar applications above the earth's surface have had their continuity of service lengthened by using these Reliance protected motors. Splashing water and falling material cannot hurt them. Special insulation protects the stator windings from acids and moist atmosphere. The lower maintenance alone will pay you to investigate them.

For further details see Bulletin 110.

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For the Midland Electric Coal Corporation, Marion Steam Shovel Company, Marion, Ohio, has built the world's largest shovel...eight stories high...almost half a block long...with a dipping capacity of twenty cubic yards. In a demonstration at Middle Grove, Illinois, the shovel scooped 30 tons of soil at a bite!

In this mammoth shovel, as in many outstanding mechanical and automotive achievements, you'll find Agathon Alloy and Carbon Steels.

Remember, Republic Metallurgists are always glad to help you design for strength, safety and unusual service.

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CENTRAL ALLOY DIVISION, MASSILLON, OHIO

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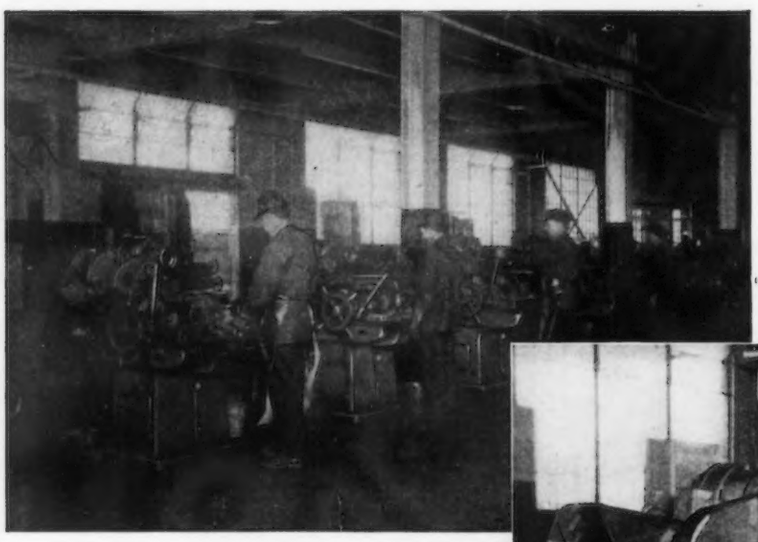
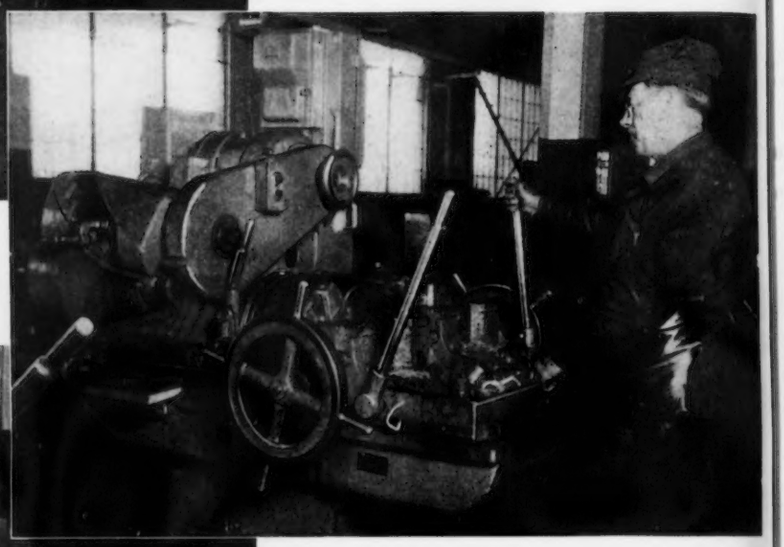
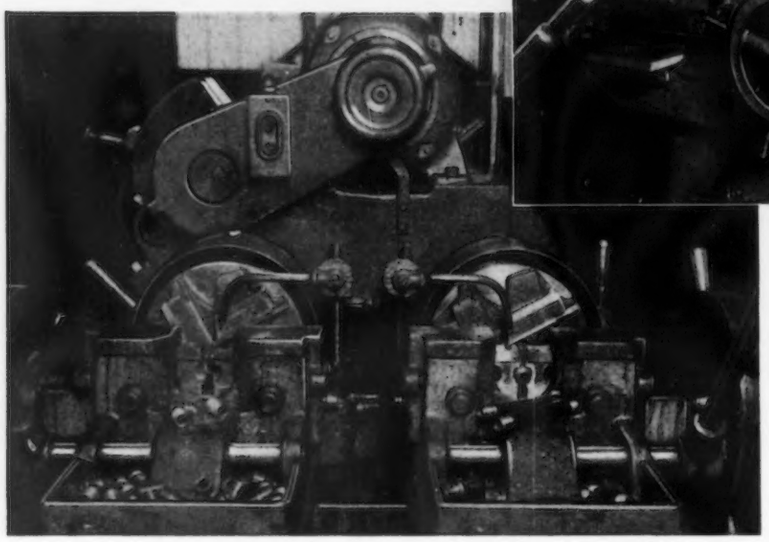


LANDIS Pipe and Nipple Threading Machines





—for economical production

LANDIS Pipe and Nipple Threading Machines have no equal for low-cost production.

LANDIS Machines are geared for high operating speeds, thus insuring maximum production. They thread, ream, and chamfer the nipple in one chucking, making it possible for one operator to obtain a continuous flow of production from a double head machine. They employ the long-life LANDIS Chaser which has the free-cutting action of a lathe tool and which insures a remarkably low tool cost on production work.

Wherever pipe nipples are profitably manufactured to modern standards for accuracy, you will find LANDIS Pipe and Nipple Threading Machines in operation.

Write today for details.

LANDIS MACHINE COMPANY, Inc.

Waynesboro, Penna.

Off with the Shackles of DEAD WEIGHT!

The atmospheric corrosion resistance of U S S COR-TEN is based upon ACTUAL TESTS extending over a period of years in several different atmospheres. Our statements are based on actual experience — not upon accelerated or laboratory tests.

EACH grade of U S S High Tensile Steel has a definite place in lighter weight construction, and in reducing operating costs. With splendid fabricating qualities, U S S COR-TEN is moderately alloyed for higher strength and higher resistance to atmospheric corrosion. These important factors reach their peak in the U S S 18-8 STAINLESS grade.

U S S HIGH TENSILE Steels are supplied in shapes, plates, bars, strip, sheets, rods, wire and wire products, pipe and tubular products. Address any of the following companies for full information and literature.

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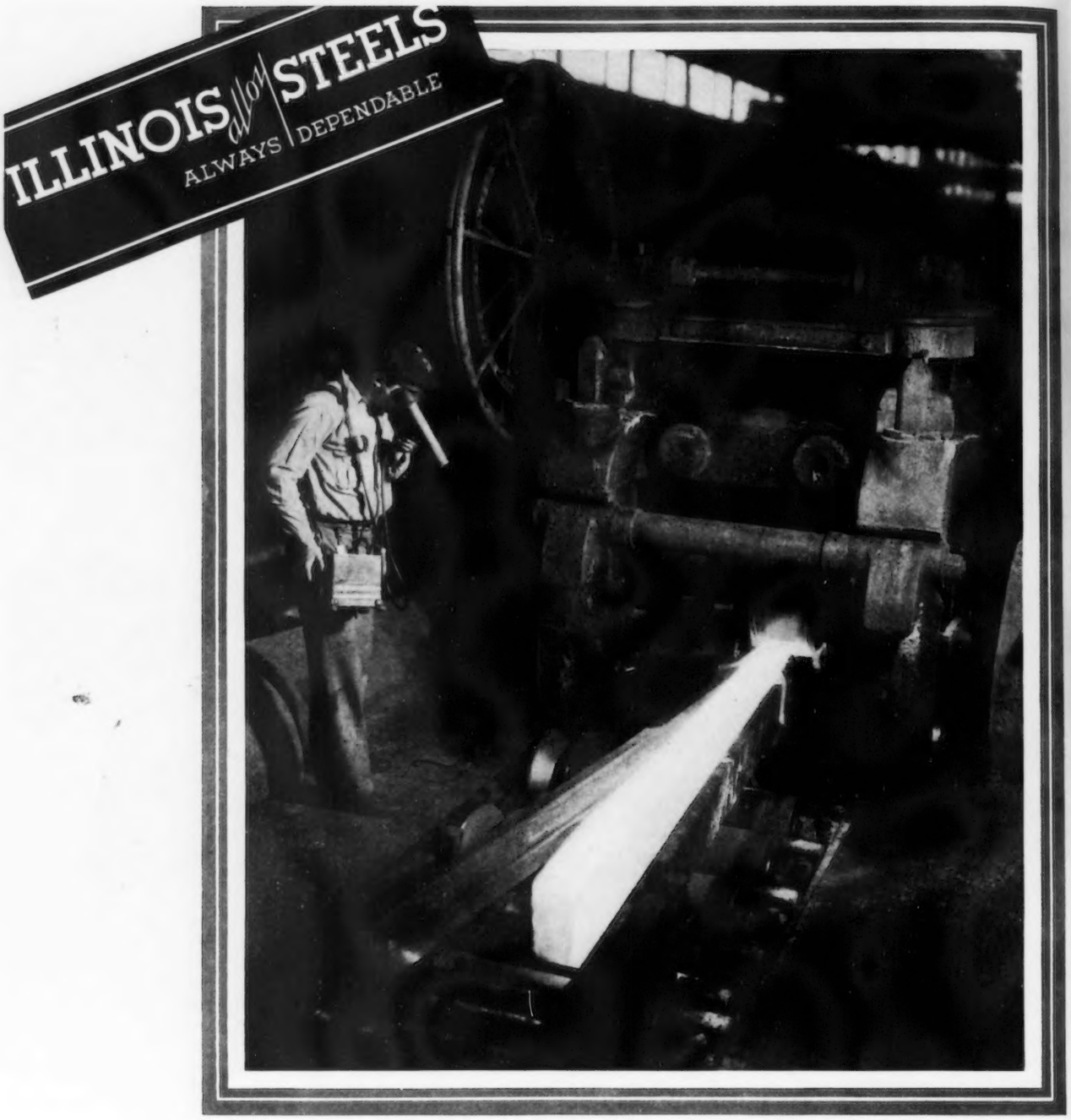
AMERICAN STEEL & WIRE COMPANY, *Chicago* **COLUMBIA STEEL COMPANY**, *San Francisco*
CARNEGIE STEEL COMPANY, *Pittsburgh* **ILLINOIS STEEL COMPANY**, *Chicago* **NATIONAL TUBE COMPANY**, *Pittsburgh*
Pacific Coast Distributors—COLUMBIA STEEL COMPANY, San Francisco, Calif. *Export Distributors*—UNITED STATES STEEL PRODUCTS CO., New York, N. Y.

United States Steel Corporation Subsidiaries

USS HIGH TENSILE STEELS



SCIENCE SAYS "*THUMBS UP*"

● There goes a billet of Illinois Alloy Steel, two seconds out of the pre-heating furnace, entering the first stand of rolls. What's its temperature? The pyrometer will tell. For every billet must enter the mill at a precise temperature. Heat and speed are controlled exactly in this mill to assure the physical qualities required in the finished steel.

Part of the job is in the heating furnace. There modern design and modern control assure uniform heating throughout every inch of the billet. Then, in the mill itself, a constant watching of rolling speeds and repeated checking of temperatures brings the finished stock out on to the cooling bed in accordance with the dictates of the metallurgist.

Illinois' alloy mills have been modernized in every particular. We know of no other mill practice which so safeguards the mechanics of rolling or the quality of the steel it produces.

ILLINOIS STEEL COMPANY
208 SOUTH LA SALLE STREET, CHICAGO, ILLINOIS

United States Steel Corporation Subsidiary

Freight Terminal in Lower Manhattan is

HEAVILY FRAMED

ST. JOHN'S PARK FREIGHT TERMINAL in New York, designed for a later addition of 8 stories, has in the massive framework of its present four stories 21,000 tons of steel, all fabricated by American Bridge Company.

This huge building is the southern terminus of the New York Central Railroad's new elevated and depressed freight line on the west side of Manhattan, and as such is part of the very important grade-elimination program that the New York Central has under way.

In ground area this building is impressive—800 feet long by 219 feet wide at one end and 276 feet at the other. Train tracks enter at the second floor level alongside unloading platforms which, by means of elevators, are accessible to trucking bays at the street level and to storage floors above.

St. John's Park Freight Terminal. Designed by the engineers of the New York Central Railroad. James Stewart & Co. of New York, General Contractors. Post & McCord, Inc., steel erectors. In addition to the steel for this Terminal, American Bridge Company has fabricated and erected part of the viaduct, and is now fabricating two depressed-track sections of the line.

AMERICAN BRIDGE COMPANY

GENERAL OFFICES: *FRICK BUILDING • PITTSBURGH, PA.*

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MORE CLEANING POWER PER DOLLAR

You can't buy more cleaning power with your dollar than you get from Wyandotte Metal Cleaners. They are every ounce active cleaning material—every particle working to the very fullest extent.

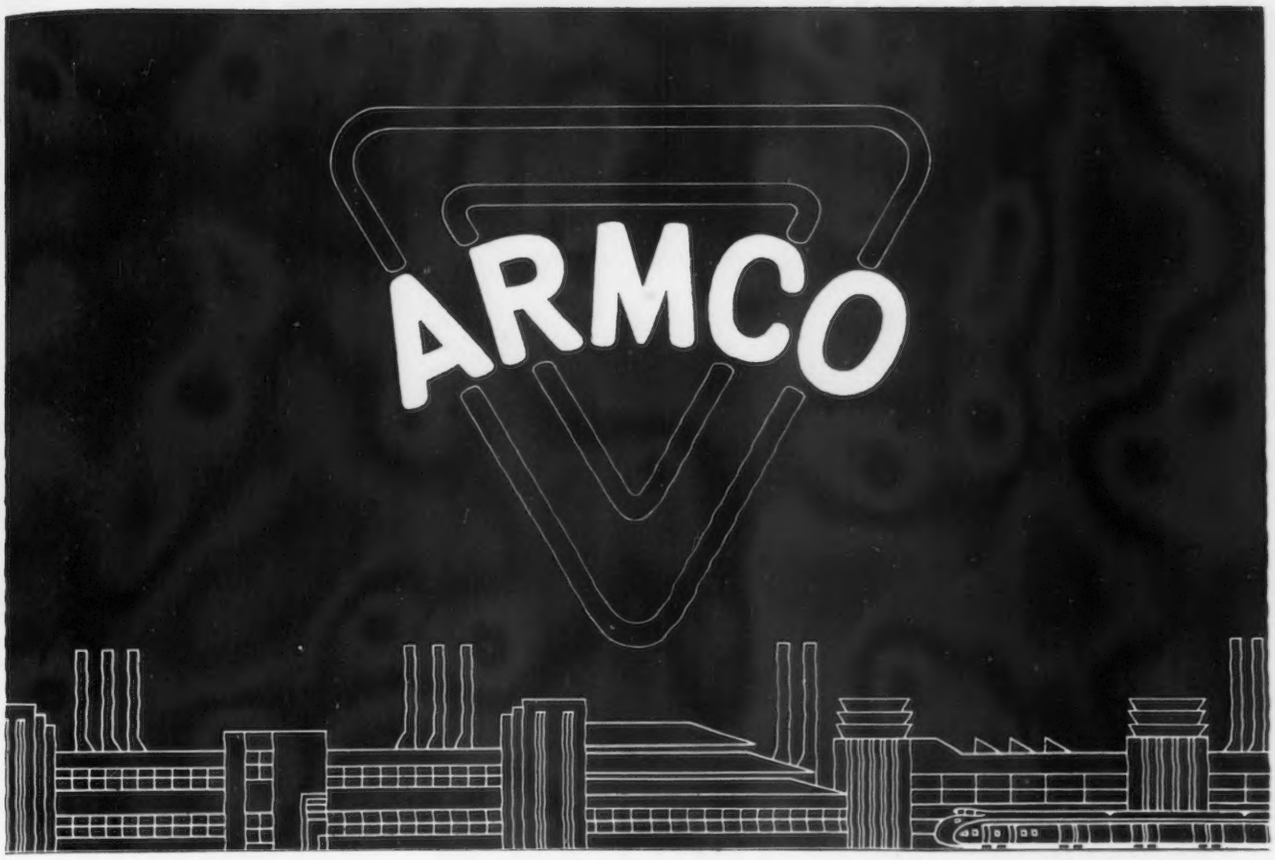
That's what makes Wyandotte so economical and so efficient for cleaning metal. When you buy Wyandotte, you aren't paying for water or for inert materials.

Wyandotte goes into solution quickly and completely, maintains its cleaning strength in solution over surprisingly long periods of time, and turns out metal which is thoroughly clean and ready for the finishing operation.

Write for detailed information.

THE J. B. FORD COMPANY WYANDOTTE, MICHIGAN

Wyandotte
Metal Cleaners



MAKES PAINT PAY PROFITS

● **Says Armco:** "The American Rolling Mill Company has placed painting on a scientific basis. Not only do we consider the effect of color in relation to accident prevention, but we follow the standards which have been developed for painting pipe lines and other mill equipment. We also follow the indexes to color, and the indexes to surfaces to be painted, as well as the standard instructions for the cleaning and painting of surfaces.

"Armco Mills are devoted to the manufacture of special analysis iron and steel sheet metal; and many revolutionary developments designed to improve quality as well as increase production and reduce manufacturing costs have been developed in Armco laboratories and mills.

"Armco believes not only in maintaining quality in product, but also in maintaining mill buildings and equipment in tiptop condition. The proper painting of interior and exterior surfaces receives most careful study. In this work Sherwin-Williams Paint Engineers have been able to help us systematize and standardize our painting in the interest of both appearance and economy."

● **Sherwin-Williams Metal Protective finishes** are a major item in this systematized plan of paint engineering. Kromik primer and Metalastic finish coat will serve you as they are serving the American Rolling Mill Company. Call on the Sherwin-Williams Paint Engineer. His service is available to you at any time without obligation. The Sherwin-Williams Co., Dept. 648, Cleveland, Ohio, and other principal cities.

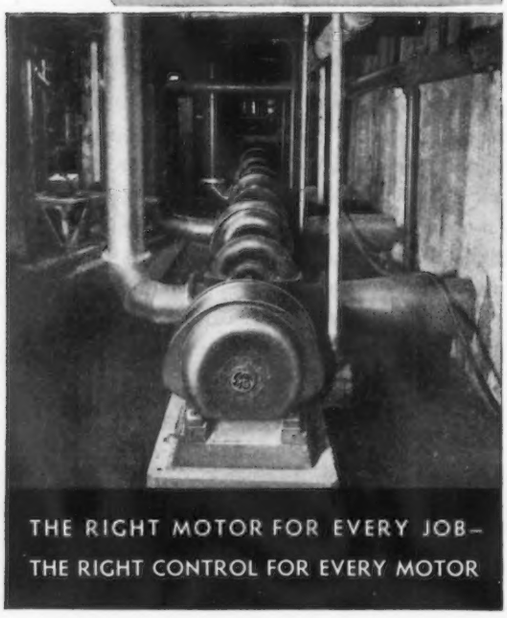
SEE THE SHERWIN-WILLIAMS PAINT ENGINEER

SHERWIN-WILLIAMS PAINTS

NRA CODE **METAL PROTECTIVE FINISHES**

WHICH MOTOR for Jobs Where There are SPLASHING LIQUIDS?

Wound-rotor induction motors for cranes, hoists, and other high-starting-torque jobs; also for speed control on fans
Gear-motors—compact, efficient low-speed drives for your conveyors, low-speed pumps, machine tools, etc.
The G-E Splashproof Motor
Squirrel-cage induction motors*—simple, sturdy motors for your run-of-the-plant jobs
*Typical of Frames 326 and smaller
Direct-current motors—use them where you want unusually fine speed control, or where your power is d-c.



IF your machinery must be washed down, or if it operates where there are splashing or dripping liquids or falling particles, you can save money and get longer motor life and more dependable service if you use G-E splashproof motors and control for your jobs. Squirrel-cage induction, wound-rotor induction, synchronous, direct-current—whatever type of motor your job requires, we can supply you with the RIGHT motor, protected against splashing liquids or falling particles.

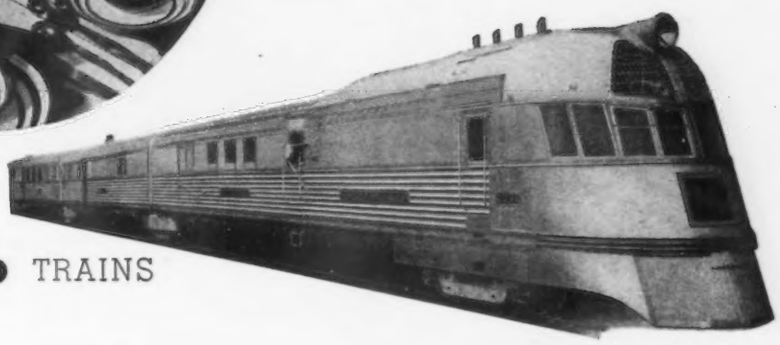
Have you a job for a splashproof motor in your plant? If so, why not see a sales engineer in the nearest G-E office? He's well grounded in motor application, and back of him is General Electric's more than 40 years' experience in the design, manufacture, and application of motors for industry. All this experience is available to help you get the most profitable solution of your drive problems. General Electric, Schenectady, N. Y.

020-105

GENERAL ELECTRIC

CHROMIUM *the key Metal*

FROM TABLEWARE



TO TRAINS

for RESISTANCE to CORROSION

■ Chromium is the key that opens new fields of applications for steel. It has made possible the entire series of stainless steels. These steels combine strength and durability with corrosion resistance and beauty. This unique combination makes possible economical, light-weight construction. When corrosion problems arise, engineers specify corrosion-resistant chromium steels.

The most satisfactory stainless steel is made by the use of Low-Carbon Ferrochrome. Electromet offers a variety of low-carbon grades.

Experienced Electromet Metallurgists will gladly give you advice and opinions on the use of stainless steels. A request will bring you complete information.

ELECTRO METALLURGICAL COMPANY

Unit of Union Carbide and Carbon Corporation

UCC

CARBIDE and CARBON BUILDING,
30 EAST 42nd STREET • NEW YORK, N.Y.

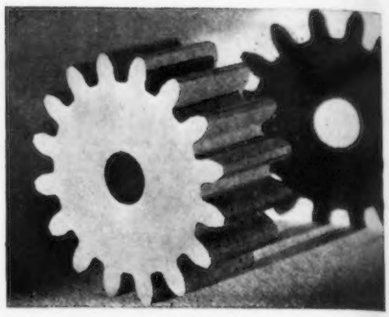
Electromet
Ferro-Alloys & Metals

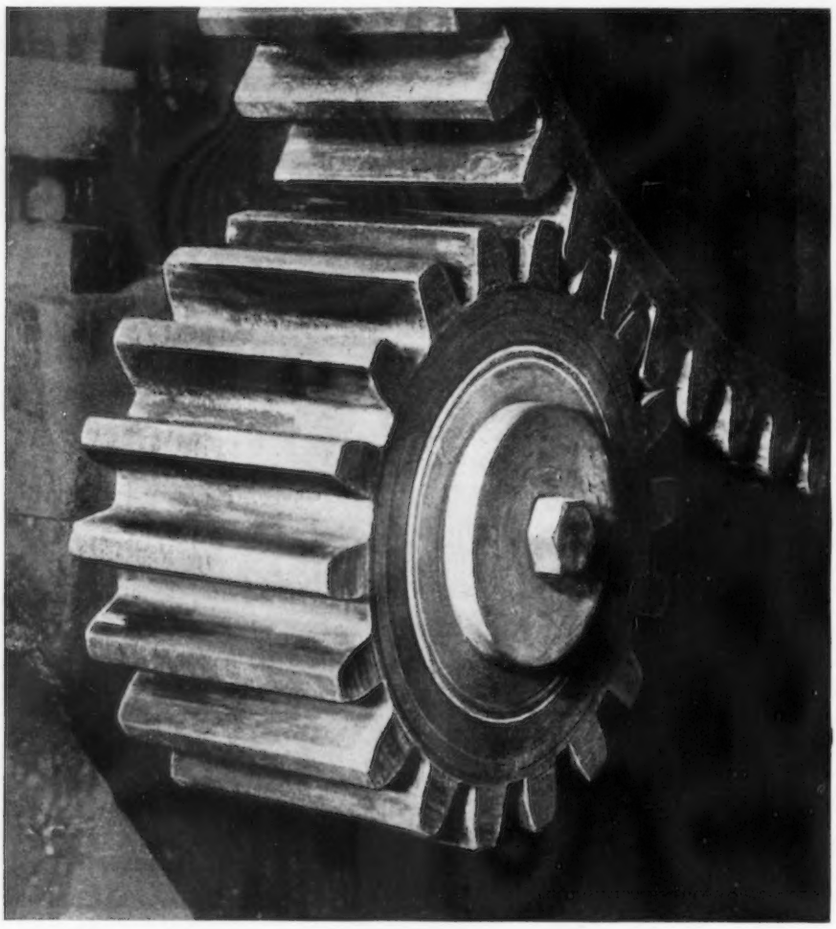
QUICK RELIEF
for Clamorous Gears

NERVE-RACKING noise from all-metal gear drives loudly proclaims needless waste of power and lowered energy and efficiency of the working force. Scientifically conducted tests in factories show that noise and waste are synonymous.

Where gear drives are the offenders, quick relief may be had through the use of a Bakelite Laminated silent gear or pinion to mesh with metal gears and do away with metal-to-metal contact of gear teeth. In addition to reducing gear noises to a mere murmur their use reduces the wear and lengthens the life of the metal gears with which they mesh.

Bakelite Laminated gears have great strength, surpassing that of cast iron. They cannot corrode and are resistant to moisture, oil, acids, alkalies and most chemicals. When operating in dust-laden atmospheres they decrease abrasive wear on the engaging metal gears.





There are several different types of Bakelite Laminated gear material, some suited for small, light weight, finely cut gears, and others so tough and strong that they are successfully used for driving the heaviest types of machinery.

To learn about these several types of Bakelite Laminated silent gears and their uses we invite you to write for our descriptive illustrated 52-page booklet 2L, "Bakelite Laminated".

★

Bakelite Laminated gears and blanks are manufactured under the following trade-names: FORMICA *(Formica Insulation Co., Cincinnati, O.),* LAMICOID *(Mica Insulator Co., Schenectady, N. Y.),* MICARTA *(Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.),* PANELYTE *(Panelyte Corp., Trenton, N. J.),* PHENOLITE *(National Vulcanized Fibre Co., Wilmington, Del.),* SYNTHANE *(Synthane Corp., Oaks, Pa.)*

BAKELITE CORPORATION, 247 Park Avenue, New York, N. Y. . . . . 43 East Ohio Street, Chicago, Ill.
BAKELITE CORPORATION OF CANADA, LIMITED, 163 Dufferin Street, Toronto, Ontario, Canada

BAKELITE

REGISTERED U. S. PAT. OFF.

The registered trade marks shown above distinguish materials manufactured by Bakelite Corporation. Under the capital "B" is the numerical sign for infinity, or unlimited quantity. It symbolizes the infinite number of present and future uses of Bakelite Corporation's products.

THE MATERIAL OF A THOUSAND USES

Over a Century of Experience

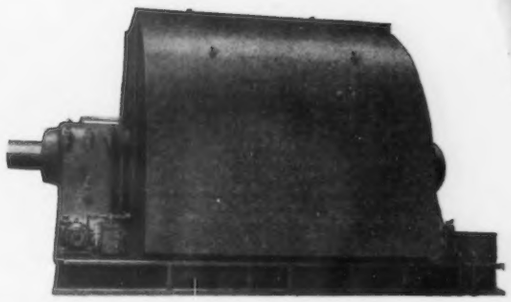
IN BUILDING PRECISION EQUIPMENT

Over a century of experience

★ Behind these simple words lies a story almost without parallel in service to industry. This organization saw and *helped* in the first crude developments of the electric motor. And during its development through the years, Fairbanks-Morse has been working with motor users in every branch of industry—working hand in hand to create the finest kind of motors for every conceivable requirement.

Because of this tradition of craftsmanship and of coöperation with users of its motors, Fairbanks-Morse customers have come to look on an F-M motor as an *investment* in dependability and economy.

In steel mill service, for instance, the heavy duty synchronous motor, illustrated, has forced ventilation. The normal rating is 3000 horsepower with the maximum rating at 12,000 horsepower. Steel construction is used throughout, with fabricated steel base and enclosures, and other major mechanical parts of cast steel. Separate motor-driven positive pressure oil pumps are supplied for each bearing, one of which is shown on the left. Exceptional sturdiness in construction provides for "plugging". Other mechanical features, regulation and control make Fairbanks-Morse synchronous motors especially adapted for steel mill service.



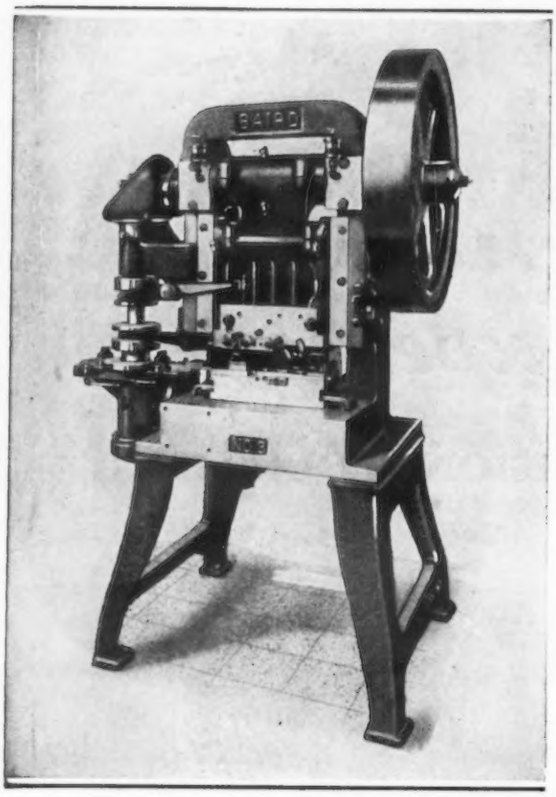
Before you buy a motor for any purpose, see what Fairbanks-Morse has developed for that specific service. For complete information write Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill. 32 branches at your service throughout the United States.

Pioneer Designers and Manufacturers of
105 Years

FAIRBANKS-MORSE
MOTORS

POWER, PUMPING AND WEIGHING EQUIPMENT

6302—EA 40.73



SOMETHING NEW!

AUTOMATIC MULTIPLE TRANSFER PRESSES

The latest of the many Baird achievements is the Automatic Multiple Transfer Press for the automatic production of stampings from ribbon metal requiring several operations besides blanking.

The strip enters the press from a reel at the back of the machine, and is fed by a slide feed which may be so accurately adjusted as to remove the need for pilot pins. The transfer fingers not only transfer the blank to various stations, but they also retain their grip until the punches make contact. Scrap winds up on a reel at the front of the press, and finished stampings are ejected at a high rate of speed.

All punches have independent adjustments. The punches, dies, transfer slide and fingers constitute a unit which may be removed from the press *in a very few* minutes. This important feature eliminates time-consuming tool set-ups when changing over from one job to the next.

Over 60 years of Baird engineering skill and experience are embodied in this new Automatic Multiple Transfer Press which is built in six sizes to take strips 1½" to 6" in width. Get the full details of this new development.

"Ask BAIRD About It"

THE BAIRD MACHINE COMPANY
BRIDGEPORT, CONN.

METAL STAMPINGS

Since 1896 the Crosby plant has been devoted, exclusively, to designing and producing Sheet Metal Stampings. Avail yourself of this experience. Send us your next stamping problem and watch results.

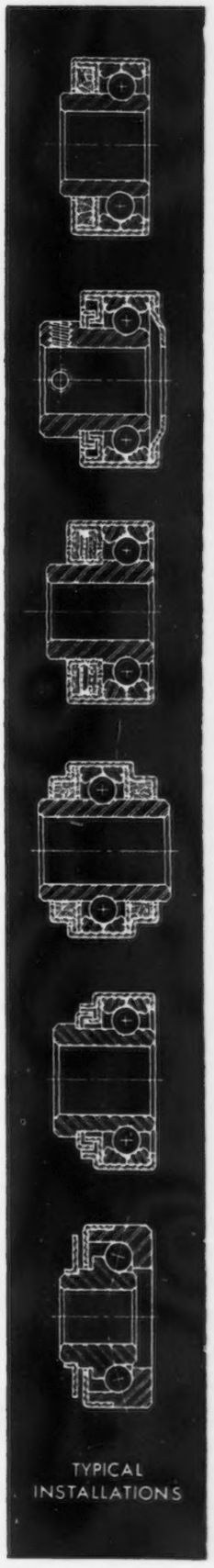
Manufacturers of "IDEAL" TROLLEY WHEELS

THE CROSBY COMPANY

General Offices and Works: BUFFALO, NEW YORK

Branch Offices: **Chicago Detroit Cleveland New York Philadelphia Pittsburgh**

LESS COST - HIGHER EFFICIENCY - SPEEDS UP TO 2500 R·P·M - EVERY SIZE
ALL TYPES OF INSTALLATION - MADE TO YOUR OWN SPECIFICATIONS



TYPICAL INSTALLATIONS

"COMMERCIAL" BALL BEARINGS meet the constantly increasing demand for good bearings at a moderate price. "COMMERCIALS" are obtainable in all standard sizes — large or small quantities.

Also, special installations, made to your own specifications. These bearings are used in all industries and for all purposes. They reduce bearing costs and give better service.

●

THE SCHATZ MANUFACTURING CO.
Poughkeepsie, N. Y.

Detroit Sales Office: 2608 Book Tower
Chicago Sales Office: 120 N. Peoria St.

"Commercial"
ANNULAR BALL BEARINGS

Business Men!

a good buy in PHILADELPHIA

YOU men who recognize good values instantly have labeled The Vendig "a good buy in Philadelphia"—and this is why!

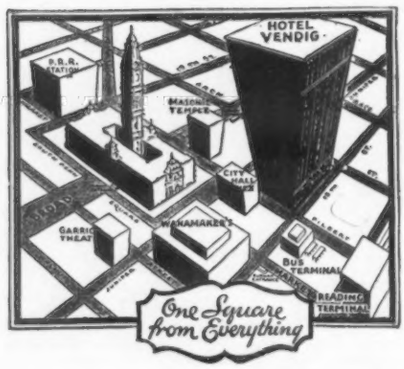
- √ **NEW and MODERN**—225 large outside rooms each with bath, ceiling fans and window screens.
- √ **MODERATE PRICE**—single from $2.50, double from $4.00 and sample rooms from $5.00.
- √ **CONVENIENT**—one square from Reading Terminal and Broad Street Station.

HOTEL VENDIG

13TH and Filbert Streets,

Philadelphia

Pennsylvania



American Hotels Corporation N.Y.

J. Leslie Kincaid
Pres.

JUST BETWEEN US TWO

Pollyanna Morgan

OUR favorite movie actor, Frank Morgan, who should know better, believes that the return of prosperity will be accelerated if everyone wears a continual smile and laughs loudly once a day.

There is nothing more depressing than a perpetual silly grin, and we will bet a bottle of Father John's cough medicine against a bottle of Mr. Morgan's Angostura that his recipe would plunge us into depths compared with which February, 1933, would look stratospheric.

To the Letter

PAINSTAKING is the word for our clipping bureau, which has orders to send us all printed references to The Iron Age. A recent batch of clippings includes a newspaper item about the discovery of the skeleton of a gentleman who was buried in the iron age. Then there is one regarding a factory we never heard of in Niagara Falls, known as "the Iron Age plant."

The latest is a newspaper item regarding the "Iron Age," the only iron sailing vessel registered in the United States in 1876. It rounded Cape Horn with only one fatality, which looks piddling compared with the marine fatality record of sixty years later, and shows what enormous strides have been made in seamanship.

The clipping bureau, we are happy to report, has also sent us some clippings referring to the world's greatest, and possibly most widely quoted, industrial paper.

Hubert Says a Kind Word

ONE of our august advertising representatives shouts hooray at our recent crack about the mediocrity of most publications' advertising of themselves.

But we are inclined to pull in our horns, being painfully conscious of the truth in the observation that it is far easier to be a second-rate critic than a third-rate performer. And besides, someone might say, *"What do you suggest?"* which would be embarrassing, as we have tried many times and find ourselves harping on the same strings that practically every publisher strums endlessly—*"Our reader interest is high"*—*"We lead in advertising"*—*"Our circulation is growing fast"*—*"Our readers are all big shots with tremendous buying power"*—and so on.

Even though these are cosmic truths, people get tired of them. How long would interest in cigarette advertising remain at fever heat if the Camel people dwelt overlong on that solemn thought, "Camels are kind to the throat?" The cigarette people are smart. They ring in nuances. We are not quite sure that that is the right word, but it sounds erudite, so our motto is, *"More nuances in the advertising publications get up about themselves."*

Orchid

PROBABLY the most impressive advertising that publications get is not what they say about themselves, but what third parties say, if it happens to be favorable. A good example of this appeared on pages 106-7 of the Mar. 7 Iron Age.

As you read every word in your family journal, you will recall that A. G. Wentworth, assistant sales manager of The Seymour Manufacturing Co. (nickel silver, phosphor bronze), Seymour, Conn., said:

> *"On a recent trip covering a considerable territory, I asked practically all of those whom I contacted, what magazine was read most carefully and from which the most benefit was derived. It might interest you to know that The Iron Age received the most favorable comment."*

Accolade

SPEAKING of bouquets, we hereby toss one at the man who prepared that New Departure front cover on the Mar. 14 Iron Age, "Oil—Hero or Villain?"

Discovers New Ray

WE see by page 30 of the Mar. 7 Iron Age that a new shear blade sharpener has a bed "provided with V-rays for carriage travel." These inventors. What won't they be getting up next?—A.H.D.

STANDARD DIAMOND
Actual Size

"A.W."

TYPES

DIRECTIONAL DIAMOND FLOOR PLATES

"A.W." Diamond Pattern Floor Plates are the accepted standard for a steel product used where safe, nonslip, durable surfaces are desired.

"A.W." Standard Diamond Pattern used under severe traffic conditions is rolled in thickness ⅛" to 1", in widths up to 72" and lengths to 300".

"A.W." Diamondette Pattern, lighter in weight per sq. ft. but with no sacrifice of efficiency and suggested for lighter traffic conditions and pedestrian service is rolled in thickness ⅜" to *No. 24 gauge in widths up to 60" and lengths to 240".

ALSO NEW ALL-DIRECTION **SUPER-DIAMOND** PATTERN FLOOR PLATE.

Descriptive Folders mailed upon request

** No. 16 to 24 gauge—Exclusive Patented Process*

109 YEARS IRON & STEEL MAKING EXPERIENCE

ALAN WOOD STEEL CO.

Conshohocken, Pennsylvania

Philadelphia
New York
Memphis

Seattle
San Francisco
Los Angeles

DIAMONDETTE
Actual Size

HENDRICK

The Mark of

Quality

Perforated Plate

From a wide range of special punches and dies, Hendrick is in an excellent position to fill your most unusual perforated metal requirements.

To get a quality product and prompt delivery at a reasonable price, write to Hendrick.

HENDRICK MFG. CO.

37 Dundaff Street, Carbondale, Pa.

Baltimore Birmingham Boston Cincinnati Cleveland Detroit Hazleton New York Philadelphia Pittsburgh

Manufacturers of Miteo Open Steel Flooring; Elevator Buckets; Light and Heavy Steel Plate Construction.

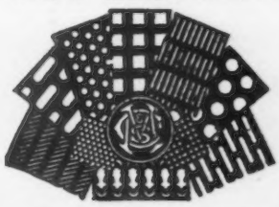
MUNDT

PERFORATED METALS

Large stocks of all metals always in hand ready to punch for any arrangement of perforations.

Sixty-one years of manufacturing perforated metals for every conceivable purpose assures satisfaction.

Write for Catalog of Patterns.



TIN, STEEL, COPPER, ALUMINUM, BRONZE, BRASS, ZINC, ANY METAL, ANY PURPOSE

CHARLES MUNDT & SONS

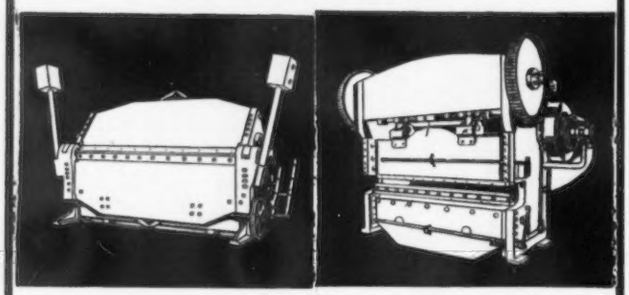
59 FAIRMOUNT AVE., JERSEY CITY, N. J.

HYDRAULIC BULLDOZERS

That Control the Dwell to Set the Metal—
Prevent Improper Setting and Breakage—
Save Die Setting Time—
Decrease Wear on Dies—
Adjustable—Speedy and Continuous Operation.

THE CHARLES F. HYDRAULIC MACHINERY SINCE 1851 ELMES CHICAGO *ENGINEERING WORKS*
PHONE: HAYmarket 0696 *1003 Fulton St., Chicago*

CHICAGO STEEL BRAKES —PRESSES—SHEARS



DREIS & KRUMP MFG. CO.
7430 LOOMIS BLVD. CHICAGO, ILL.

SOMETHING NEW AND BETTER IN SHEET METAL SHEARS

NO FLYWHEEL
NO CLUTCH
NO TREADLE
ARC WELDED
NO COUNTER-WEIGHTS
NO MOTOR IDLING
AUTOMATIC HOLD-DOWN

Write for complete details.

Beatty also builds punching and shearing machines, vertical bulldozers, coping machines, spacing tables, and the Hammond Neverslip Portable Floor Crane.

BEATTY MACHINE & MFG. CO., 936-150TH STREET HAMMOND, IND.

Emery Wheel Dressers

Two Sizes **CUTTERS** Nos. 1-2

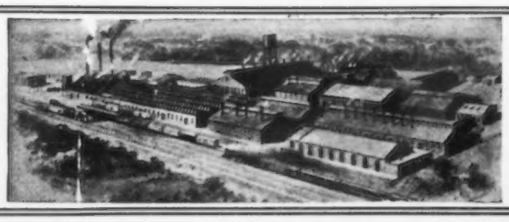
We make the regular Huntington (Pattern) for all sizes, Roughing for Nos. 1 and 2. Paragon for No. 1 only.

GEO. H. CALDER CO., Lancaster, Pa., U. S. A.

Robinson Sheet Metal Working Machinery

Inclinable Presses — Gap Presses
Double Crank Presses — Squaring Shears
Horning Presses — Gap Shears
Toggle Presses — Corrugating Machines
Hand and Power Brakes

NEW ALBANY MACHINE MFG. CO.
Sole Owners, J. M. Robinson Mfg. Co.
NEW ALBANY, IND.



THE ATHENIA STEEL CO.

135 William Street, New York — Works, Athenia, N. J.

Makers of High Grade Tempered and Polished Steel for Clock, Watch, Motor and Typewriter Springs. Also Wound Springs. Tempered and Untempered Steel for other purposes. Special quality equal to finest imported for finish and accurate rolling. Also Stainless Steels of various grades.

AGENTS:—
Lapham Hickey Co.—3333 W. 47th Place, Chicago, Ill.—414 United Artists Bldg., Detroit, Mich.
The Hamilton Steel Co.—East 131st Street and Taft Ave., Cleveland, Ohio.
E. F. Krause & Co.—817 Yale Street, Los Angeles, Calif.
Hill Chase & Co.—Richmond and Ontario Sts., Philadelphia, Pa.
Wetherell Bros. Co.—251 Albany St., Cambridge, Mass.

TRACK SPIKES
BOAT SPIKES
DOCK SPIKES
GUARD SPIKES
TRACK BOLTS

STEEL BARS IRON
DEFORMED REINFORCING

W. AMES & CO.

ESTABLISHED 1859
ROLLING MILL FACTORY — JERSEY CITY, N. J. — WAREHOUSE OFFICE

MACHINE BOLTS
TIE RODS
WASHERS
SPLICE BARS
RIVETS—NUTS

Since 1854
CLARK BROS. BOLT COMPANY
Continuous Better Bolt Construction
AT MILLDALE, CONN.

Why Stamping Users Come to Parish!

MOTOR COVER

There are two kinds of stampings—those easy to make and those that involve difficulties. On the easy jobs our facilities can turn them out like hot cakes at prices attractive to you.

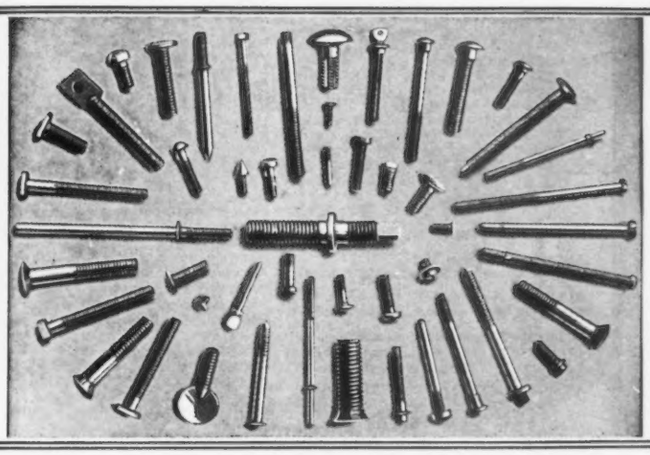
The difficult stamping may require a special alloy steel for proper wear resistance. Or it may involve a question of design with its attending production problems.

Parish is equipped in both laboratory and shop to recommend the right type of alloy steel, assist in design, and put the stamping into production in a way that frequently reduces the number of operations. Parish also provides the correct heat treatment for alloy stampings.

At Parish you get an experienced and complete stamping service at the right price.

PARISH PRESSED STEEL CO., Reading, Pa.

PACIFIC COAST REPRESENTATIVE
F. Somers Peterson Co., 57 California St., San Francisco, Cal.



WHEN IN NEED OF

MACHINE SCREWS — SPECIAL STUDS
MACHINE SCREW NUTS — SPECIAL SCREWS

COMMUNICATE WITH
THE HOUSE OF SERVICE

THE PROGRESSIVE MANUFACTURING CO.
TORRINGTON, CONN.

We please those discriminating manufacturers who not only demand quality but service as well. Business goes where it is invited and remains where it is well treated. The illustration reveals a few only of the possibilities that are developed by the cold heading process.

M. D. HUBBARD SPRING CO.

SOUTH SAGINAW AND JESSIE STREETS
PONTIAC, MICH.
ESTABLISHED 1905

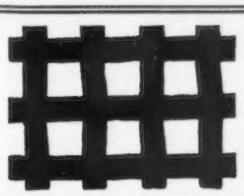
COILED and FLAT SPRINGS
(Phosphor Bronze Springs a Specialty)
WELCH PATENT EXPANSION PLUGS
(For Closing Core Holes)
SPECIAL WIRE SHAPES SMALL STAMPINGS
WASHERS and SPRING COTTERS
Send blue prints or samples for estimates.
(CATALOG MAILED UPON REQUEST)

WELCH PAT. EXPANSION PLUG

LEE-BUILT SPRINGS

Compression, Extension, Flat, Torsion, Wire Forms, Small Stampings

LEE SPRING CO., INC.
30 Main St., Brooklyn, N. Y.



MICHIGAN WIRE CLOTH CO.

ESTABLISHED 1864

EVERYTHING IN WIRE CLOTH

Pioneers in the manufacture of DOUBLE CRIMP WIRE CLOTH and WIRE SCREENING of every kind possible to weave, made of Steel, Iron, Brass, Copper, Bronze, Aluminum, German Silver, Pure Nickel, Galvanized, Tinned, Monel, Manganese, Zinc and Stainless Steel; also Wire Lath, etc.
Also drawers of Brass, Copper, Bronze, German Silver, Pure Nickel, Aluminum, Monel Metal, Wire, etc.
2117 HOWARD STREET, DETROIT, MICH. Write for Catalogue No. 25

V & O POWER PRESSES
AUTOMATIC FEEDS
AUTOMATIC THREADING MACHINES
THE V & O PRESS CO., HUDSON, N. Y.

THOMAS
SPACING MACHINE COMPANY
PITTSBURGH
PUNCHING AND SHEARING MACHINERY

WEIRTON
PRODUCERS OF
Pig Iron; Open Hearth Steel, Billets, Slabs, Sheet Bars, Skelp, Angles, Beams and Channels, Round, Square and Flat Bars, Rails, Steel Plates, Tie Plates, Track Spikes, Splice Bars, Reinforcing Bars, Coke Tin Plate; Kanners Special Cokes, Best Cokes, Charcoals, Lacquered Tinplate.
Tin Mill Black Plate (All Finishes); Lacquered Black Plate; Copper Bearing Terne Plate.
Hot and Cold Rolled Strip Steel and Strip Steel Sheets. High Finish Sheets; Long Terne Sheets (Common and Special Finishes); Galvanized, Black and Blue Annealed Sheets; Corrugated Sheets, V Crimp Sheets, Roll Roofing.
Single Pickled, Full Finished and Autobody Sheets.
Coke, Tar, Benzol, Toluol, Ammonium Sulphate.
WEIRTON STEEL CO.
WEIRTON, W. VA.
Division of National Steel Corporation
Sales Offices in All Principal Cities
SAVE WITH STEEL

BURDEN IRON
Manufacturers of Genuine Wrought Iron Products
Staybolt Iron—solid and hollow rolled.
Hollow Rolled Staybolts. Engine Bolt and Chain Iron.
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ALLOYS—Vanadium
Vanadium Corp. of America, 120 Broadway, N. Y. C.

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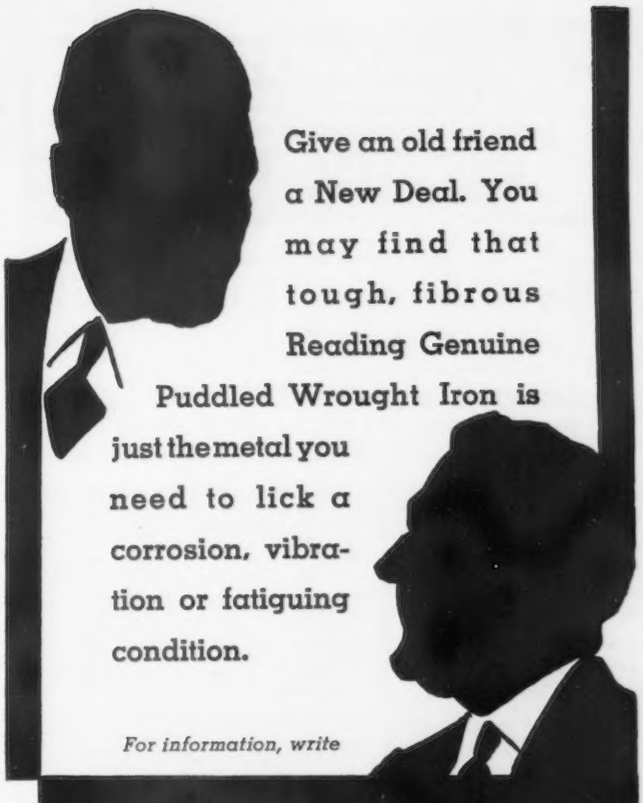

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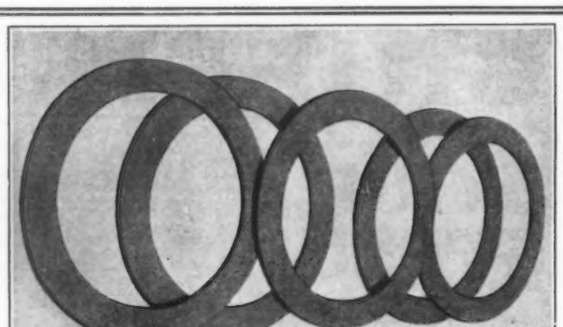

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Demag Corp., Duisburg, Germany.
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Jeffrey Mfg. Co., The, Columbus, Ohio.
COBALT, METAL
Central Trading Corp., 511 Fifth Ave., N. Y. C.
COCKS—Drain & Shut-Off
Weatherhead Co., The, Cleveland.
COILS—Pipe
Harrisburg (Pa.) Pipe & Pipe Bending Co.
COKE—Metallurgical
Cleveland Cliffs Iron Co., Cleveland, Ohio.
Pickands Mather & Co., Cleveland.
COKE OVEN MACHINERY
Atlas Car & Mfg. Co., Cleveland.
Koppers Construction Co., The, Pittsburgh.
COKE OVENS—By-Products
Koppers Construction Co., The, Pittsburgh.
COKE OVENS—Cross Regenerators
Koppers Construction Co., The, Pittsburgh.
COKE OVENS—With Recovery of By-Products
Koppers Construction Co., The, Pittsburgh.
COMPOUNDS—Drawing
Gulf Refining Co., Pittsburgh.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Tide Water Oil Co., 17 Battery Place, N. Y. C.
COMPRESSORS—Air
Demag Corp., Duisburg, Germany.
Fairbanks, Morse & Co., Chicago.
General Electric Co., Schenectady, N. Y.
Spencer Turbine Co., Hartford, Conn.
Westinghouse Air Brake Co., Industrial Div., Pittsburgh.
Worthington Pump & Mchry. Corp., Harrison, New Jersey.
COMPRESSORS—Gas
Demag Corp., Duisburg, Germany.
Worthington Pump & Mchry. Corp., Harrison, New Jersey.
CONCRETE REINFORCEMENT
American Steel & Wire Co., Chicago.
CONDENSERS—Surface & Jet
Worthington Pump & Mchry. Corp., Harrison, New Jersey.
CONTRACTORS' SUPPLIES — Second-Hand
Albert & Davidson Pipe Corp., 2nd Ave., 50-51st St., Bklyn., N. Y.
Albert Pipe Supply Co., Inc., Berry & N. 13th St., Bklyn., N. Y.
CONTROLLERS—Crane
Cutler-Hammer, Inc., Milwaukee.
CONTROLLERS—Electric
Cutler-Hammer, Inc., Milwaukee.
Electric Controller & Mfg. Co., Cleveland
General Elecetric Co., Schenectady, N. Y.
CONTROLLERS—Valve, Electrically Operated
Cutler-Hammer, Inc., Milwaukee.
Vickers, Inc., 1420 Oakman Blvd., Detroit.
CONVEYING AND ELEVATING MACHINERY
Bartlett, C. O., & Snow Co., The, Cleveland.
Jeffrey Mfg. Co., The, Columbus, Ohio.
Link-Belt Co., Chicago.
CONVEYOR WORMS
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.
CONVEYORS—Portable
Jeffrey Mfg. Co., The, Columbus, Ohio.
COPING MACHINES
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
CORE OIL
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Sun Oil Co., Philadelphia.
Tide Water Oil Co., 17 Battery Place, N. Y. C.
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Hindley Mfg. Co., Valley Falls, R. I.
Hubbard, M. D., Spg. Co., Pontiac, Mich.
Western Wire Prods. Co., St. Louis, Mo.
COUNTERBORES
Cleveland (Ohio) Twist Drill Co.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
COUNTER—Production
Veeder-Root, Inc., Hartford, Ct.
COUNTERS—Revolution, Recording
Bristol Co., Waterbury, Conn.
COUNTING MACHINES
Veeder-Root, Inc., Hartford, Conn.
COUPLINGS—Pipe
Harrisburg (Pa.) Pipe & Pipe Bending Co.
National Tube Co., Pittsburgh.
CRANES—Crawling Tractor
Demag Corp., Duisburg, Germany.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Industrial Brownhoist Corp., Bay City, Mich.
Link-Belt Co., Chicago.
CRANES — Electric, Industrial, Truck Mounted
Elwell-Parker Electric Co., The, Cleveland.
CRANES—Electric Traveling
Armel, James P., Ptgh.
Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee, Wis.
Morgan Engineering Co., Alliance, O.
Robbins & Myers, Inc., Springfield, Ohio.
Shaw-Box Crane & Hoist Co., Inc., 402 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.
Whiting Corp., Harvey, Ill.
CRANES—Gantry
Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Demag Corp., Duisburg, Germany.
Morgan Engineering Co., Alliance, Ohio.
Whiting Corp., Harvey, Ill.
CRANES—Hand Power
Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Louden Mchry. Co., Fairfield, Iowa.
Shaw-Box Crane & Hoist Co., Inc., 402 Broadway, Muskegon, Mich.
CRANES—Jib
Shaw-Box Crane & Hoist Co., Inc., 402 Broadway, Muskegon, Mich.
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Industrial Brownhoist Corp., Bay City, Mich.

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American Monorail Co., Cleveland.
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Louden Mchry. Co., Fairfield, Iowa.
Shaw-Box Crane & Hoist Co., Inc., 402 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

CRANES—Portable
Canton (Ohio) Fdry. & Mch. Co.

CRANES—Portable Electric
Elwell-Parker Electric Co., The, Cleveland.

CRANK SHAFTS
Union Drawn Steel Co., Massillon, Ohio.

CRUSHERS—Coal
Jeffrey Mfg. Co., The, Columbus, Ohio.

CUTTERS—Die Sinking
Tomkins-Johnson Co., Jackson, Mich.

CUTTERS—Keyseating
Davis Keyseater Co., 400 Exchange St., Rochester, N. Y.

CUTTERS—Milling
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland (Ohio) Twist Drill Co.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Hartford, Conn.

CUTTING-OFF MACHINES—Cold Saw
Espen-Lucas Mch. Wks., Philadelphia.

CUTTING-OFF MACHINES — Pipe or Tubing
Bardons & Oliver, Cleveland.
Landis Mch. Co., Inc., Waynesboro, Pa.

CUTTING AND WELDING APPARATUS —Oxy-Acetylene—See Welding and Cutting Machines and Equipment—Oxy-Acetylene.

CYLINDERS — Compressed Air & Hydraulic
Tomkins-Johnson Co., Jackson, Mich.

CYLINDERS—Seamless
Harrisburg (Pa.) Pipe & Pipe Bending Co.
National Tube Co., Pittsburgh.

DEOXIDIZERS
Vanadium Corp. of America, 120 Broadway, N. Y. C.

DIE SETS
Danly Machine Specialties, Inc., Chicago.

DIE SINKING MACHINES—Automatic
Pratt & Whitney Co., Hartford, Conn.

DIES— Cast Tool Steel
Forging & Casting Corp., The, Ferndale, Mich.

DIES—Pipe Threading
Landis Mch. Co., Inc., Waynesboro, Pa.
Murchey Machine & Tool Co., Detroit.

DIES—Screw and Thread Cutting
Eastern Mach. Screw Corp., New Haven, Ct.
Jones & Lamson Mch. Co., Springfield, Vt.
Landis Machine Co., Inc., Waynesboro, Pa.
Murchey Machine & Tool Co., Detroit.

DIES—Self-Opening Adjustable
astern Mach. Screw Corp., New Haven, Ct.
Jones & Lamson Mch. Co., Springfield, Vt.
Landis Mch. Co., Inc., Waynesboro, Pa.
Murchey Machine & Tool Co., Detroit.

DIES—Sheet Metal Working
Danly Machine Specialties, Inc., Chicago.
Worcester (Mass.) Stamped Metal Co.

DIES—Steel Letters and Stamps
Noble & Westbrook Mfg. Co., East Hartford, Ct.

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DRILLING MACHINES—Bench
Buffalo (N. Y.) Forge Co., 492 Broadway.
Leland-Gifford Co., Worcester, Mass.

DRILLING MACHINES—Portable Electric
Buckeye Portable Tool Co., The, Dayton, Ohio.

DRILLING MACHINES—Portable Pneumatic
Buckeye Portable Tool Co., The, Dayton, Ohio.
Helwig Mfg. Co., St. Paul, Minn.

DRILLING MACHINES—Sensitive
Buffalo (N. Y.) Forge Co., 492 Broadway.
Leland-Gifford Co., Worcester, Mass.

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Mesta Mch. Co., Pittsburgh.

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American Foundry Equipment Co., Michawaka, Ind.
Blaw-Knox Co., Pittsburgh.
Pangborn Corporation, Hagerstown, Md.

ECONOMIZERS
Babcock & Wilcox Co., The, 85 Liberty St., N. Y. C.

ELECTRIC HEATING ELEMENTS
Globar Corp., Niagara Falls, N. Y.

ELECTRIC LIGHT PLANTS
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.

ELECTRIC LIGHTING
General Electric Co., Cleveland, Ohio.
General Electric Vapor Lamp Co., Hoboken, N. J.

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ELECTRICAL EQUIPMENT
General Electric Co., Schenectady, N. Y.

ELECTRICAL WIRES
American Steel & Wire Co., Chicago.
Roebling's, John A., Sons Co., Trenton, N. J.

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Metal & Thermit Corp., 120 B'way, N. Y. C.

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Udylite Co., The, Detroit.

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Ridgeway, Craig & Son Co., Coatesville, Pa.

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Sherwin-Williams Co., Cleveland.
Zapon Co., The, Stamford, Conn.

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Geuder, Paeschke & Frey Co., Milwaukee.

ENGINEERS—Consulting and Industrial
Austin Co., The, Cleveland, Ohio.
Elsler Engineering Co., Inc., 754 S. 13th St., Newark, N. J.
Koppers Construction Co., The, Pittsburgh.
Perin Engineering Co., Inc., 535 Fifth Ave., N. Y. C.

ENGINEERS—Management
Scovell, Wellington & Co., 10 East 40th St., N. Y. C.

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ENGINES—Gas
Demag Corp., Duisburg, Germany.
Fairbanks, Morse & Co., Chicago.
Worthington Pump & Mchry. Corp., Harrison, New Jersey.

ENGINES—Oil
Worthington Pump & Mchry. Corp., Harrison, New Jersey.

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FACTORY CONSTRUCTION
Austin Co., The, Cleveland, Ohio.

FEED WATER HEATERS AND PURIFIERS
Harrisburg (Pa.) Pipe & Pipe Bending Co.

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Oilgear Co., The, 1311 W. Bruce St., Milwaukee.

FELT—Wool Mechanical
Booth Felt Co., Inc., 435—18th St., Brooklyn, N. Y.

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Pittsburgh (Pa.) Steel Co.

FERRO ALLOYS—Chromium
Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.
Metal & Thermit Corp., 120 Broadway, N. Y. C.
Ohio Ferro-Alloys Co., Canton, Ohio.
Pittsburgh Metallurgical Co., Inc., Niagara Falls, N. Y.
Samuel, Frank, & Co., Philadelphia.
Vanadium Corp. of America, 120 B'way, N. Y. C.

FERRO ALLOYS—Manganese
Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.
Ohio Ferro-Alloys Co., Canton, Ohio.
Pittsburgh Metallurgical Co., Inc., Niagara Falls, N. Y.
Samuel, Frank, & Co., Phila.

FERRO ALLOYS—Molybdenum
Climax Molybdenum Co., 500 Fifth Ave., N. Y. C.
Vanadium Corp. of America, 120 Broadway, N. Y. C.

FERRO ALLOYS—Silico Manganese
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
Ohio Ferro-Alloys Co., Canton, Ohio.
Vanadium Corp. of America, 120 Broadway, N. Y. C.

FERRO ALLOYS—Silicon
Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.
Ohio Ferro-Alloys Co., Canton, Ohio.
Pittsburgh Metallurgical Co., Inc., Niagara Falls, N. Y.
Samuel, Frank, & Co., Phila.
Vanadium Corp. of America, 120 Broadway, N. Y. C.

FERRO ALLOYS—Silicon-Aluminum
Vanadium Corp. of America, 120 Broadway, N. Y. C.

FERRO ALLOYS—Spiegeleisen
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
New Jersey Zinc Co., The, 160 Front St., N. Y. C.

FERRO ALLOYS—Titanium
Metal & Thermit Corp., 120 Broadway, N. Y. C.
Titanium Alloys Mfg. Co., Niagara Falls, N. Y.
Vanadium Corp. of America, 120 Broadway, N. Y. C.

FERRO ALLOYS—Tungsten
Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.
Metal & Thermit Corp., 120 B'way, N. Y. C.

FERRO ALLOYS—Vanadium
Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.
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FERRO ALLOYS—Zirconium
Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.

FILES & RASPS
Disston, Henry & Sons, Inc., Philadelphia
Nicholson File Co., Providence, R. I.

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Scaife, Wm. B., & Sons Co., Pittsburgh

FIRE BRICK—Insulating
Babcock & Wilcox Co., The, 85 Liberty St., N. Y. C.
Massillon (Ohio) Refractories Co.

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FIRE CLAY
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Weatherhead Co., The, Cleveland.

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Harrisburg (Pa.) Pipe & Pipe Bending Co.
Taylor Forge & Pipe Works, Chicago.

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Nukem Products Corp., 68 Niagara St., Buffalo.

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Central Iron & Steel Co., Harrisburg, Pa.

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Dow Chemical Co., 921 Jefferson Ave., Midland, Mich.

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Flinn & Dreffein Co., Chicago.

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Mahr Mfg. Co., Minneapolis, Minn.
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Holcroft & Co., Detroit.
Rockwell, W. S., Co., 50 Church St., N. Y. C.

FURNACES—Heat Treating, Cyanide or Lead
Amer. Gas Furnace Co., Elizabeth, N. J.
Chicago (Ill.) Flexible Shaft Co.
Mahr Mfg. Co., Minneapolis, Minn.

FURNACES—Heat Treating, Electric
General Electric Co., Schenectady, N. Y.
Holcroft & Co., Detroit.
Hoskins Mfg. Co., Detroit, Mich.
Mahr Mfg. Co., Minneapolis, Minn.
Rockwell, W. S., Co., 50 Church St., N. Y. C.
Strong, Carlisle & Hammond Co., Cleve.

FURNACES—Heat Treating, Oil or Gas
Amer. Gas Furnace Co., Elizabeth, N. J.
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Mahr Mfg. Co., Minneapolis, Minn.
Rockwell, W. S., Co., 50 Church St., N. Y. C.
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Pratt & Whitney Co., Hartford, Conn.
Sheffield Gage Corp., Dayton, Ohio.

GAGES—Pressure and Vacuum, Recording
Bristol Co., Waterbury, Conn.

GAGES—Thickness, for Rolling Mills
Haines Gauge Co., The, Phila., Pa.

GAGES—Thread Lead
Jones & Lamson Mch. Co., Springfield, Vt.
Sheffield Gage Corp., Dayton, Ohio.

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GALVANIZING PLANTS—For Sheets
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GAS FOR INDUSTRIAL USES
American Gas Association, 420 Lexington Ave., N. Y. C.

GAS PRODUCERS
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Wood, R. D., Co., Philadelphia.

GAS RECOVERY COKE OVENS
Koppers Construction Co., The, Pittsburgh.

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Garlock Packing Co., The, Palmyra, N. Y.

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Taylor-Wilson Mfg. Co., McKees Rocks, Pa.

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Gleason Works, Rochester, N. Y.

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Link-Belt Co., Chicago.
United Engineering & Fdry. Co., Ptgh.

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Reliance Electric & Engineering Co., Cleveland.
Westinghouse Elec. & Mfg. Co., East Ptgh.

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Simonds Mfg. Co., Pittsburgh.

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Boston Gear Wks., Inc., North Quincy, Mass.
Chicago (Ill.) Rawhide Mfg. Co., 1306 Elston Ave.
General Electric Co., Schenectady, N. Y.

GEARS—Rawhide
Chicago (Ill.) Rawhide Mfg. Co., 1306 Elston Ave.

GEARS—Spur
Boston Gear Wks., Inc., North Quincy, Mass.
Philadelphia (Pa.) Gear Works.
Simonds Mfg. Co., Pittsburgh.

GEARS—Worm
Boston Gear Wks., Inc., North Quincy, Mass.
Philadelphia (Pa.) Gear Works.

GENERATORS—Acetylene
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Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.

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Norton Co., Worcester, Mass.

GRINDING MACHINES—Universal
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Norton Co., Worcester, Mass.

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Landis Tool Co., Waynesboro, Pa.

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Calder, Geo. H., Co., Lancaster, Pa.

GRINDING WHEELS
Bakelite Corp., 247 Park Ave., N. Y. C.
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Parish Pressed Steel Co., Reading, Pa.

HEATERS, Unit
Buffalo (N. Y.) Forge Co., 492 B'way

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Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Lukens Steel Co., Coatesville, Pa.
Pacific Coast Steel Corp., San Francisco, Calif.
Riverson, Joseph T., & Sons, Inc., Chicago.
Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.
Weirton (W. Va.) Steel Co.
Worth Steel Co., Claymont, Del.
Youngstown (Ohio) Sheet & Tube Co.

PLATES—Nickel-Clad Steel
Lukens Steel Co., Coatesville, Pa.

PLATES—Wide Steel (up to 199 in.)
Lukens Steel Co., Coatesville, Pa.

PLUGS—Core Hole
Hubbard, M. D., Spring Co., Pontiac, Mich.

POLISHING MACHINES—Bar
Medart Co., The, St. Louis, Mo.

POLISHING MACHINES—Belt
Production Machine Co., Greenfield, Mass.

POWER UNITS—Rotary
Cushman Chuck Co., Hartford, Conn.

POWER UNITS—Straight Line
Cushman Chuck Co., Hartford, Conn.

PRESSED METAL PARTS
Champion Sheet Metal Co., Inc., Courtland, N. Y.
Crosby Co., The, Buffalo, N. Y.

PRESSED STEEL PARTS
Crosby Co., The, Buffalo, N. Y.
Geuder, Paeschke & Frey Co., Milwaukee.
Lansing (Mich.) Stamping Co., So. Penn Ave.
Parish Pressed Steel Co., Reading, Pa.
Truscon Steel Co., Pressed Steel Div., Cleveland.

PRESSES—Baling
Galland-Henning Mfg. Co., Milwaukee.

PRESSES—Baling Hydraulic
Galland-Henning Mfg. Co., Milwaukee.

PRESSES—Coining
National Mchry. Co., Tiffin, Ohio.

PRESSES—Drop—See Hammers—Drop

PRESSES—Foot
Baird Machine Co., Bridgeport, Conn.

PRESSES—Forging
Mesta Mch. Co., Pittsburgh.
Morgan Engineering Co., Alliance, Ohio.

PRESSES—Forming and Bending
Dreis & Krump Mfg. Co., Chicago.

PRESSES—Friction Screw
Schatz Mfg. Co., The, Poughkeepsie, N. Y.

PRESSES—Hydraulic
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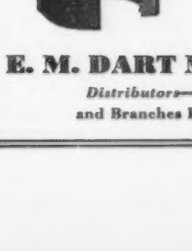

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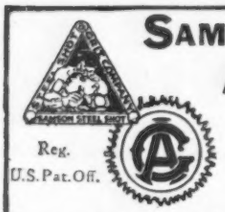

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Farrel-Birmingham Co., Inc., Ansonia, Conn.
Lake Erie Engrg. Corp., 68 Kenmore Sts., Buffalo, N. Y.
Mesta Mch. Co., Pittsburgh.
Morgan Engineering Co., Alliance, O.
Oilgear Co., The, 1311 W. Bruce., Milwaukee.
Wood, R. D., Co., Philadelphia.

PRESSES—Multiple Plunger
Waterbury (Ct.) Farrel Fdry. & Mch. Co.

PRESSES—Power
Baird Machine Co., Bridgeport, Conn.
Dreis & Krump Mfg. Co., Chicago, Ill.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Hyman, Joseph, & Sons, Phila.
New Albany (Ind.) Mch. Mfg. Co.
Niagara Machine & Tool Works, Buffalo, N. Y.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
V & O Press Co., Hudson, N. Y.
Waterbury (Ct.) Farrel Fdry. & Mch. Co.

PRESSES—Trimming
Erie (Pa.) Foundry Co.

PULLEYS—Iron, Solid & Split
Falls Clutch & Mchry. Co., The, Cuyahoga Falls, Ohio.

PULLEYS—Magnetic
Cutler-Hammer, Inc., Milwaukee.
Magnetic Mfg. Co., 626 South 28th St., Milwaukee.

PULVERIZERS
Jeffrey Mfg. Co., The, Columbus, Ohio.

PUMPS—Acid Resisting
Duriron Co., Inc., The, 438 N. Findlay St., Dayton, Ohio.

PUMPS—Boiler Feed
Aldrich Pump Co., Allentown, Pa.
Fairbanks, Morse & Co., Chicago.

PUMPS—Centrifugal
Aldrich Pump Co., Allentown, Pa.
Fairbanks, Morse & Co., Chicago.
Pomkins-Johnson Co., Jackson, Mich.
Worthington Pump & Mchry. Corp., Harrison, New Jersey.

PUMPS—Electric
Fairbanks, Morse & Co., Chicago.
Worthington Pump & Mchry. Corp., Harrison, New Jersey.

PUMPS—Hydraulic
Aldrich Pump Co., Allentown, Pa.
Elmes, Chas. F., Engng. Wks., Chicago.
Fairbanks, Morse & Co., Chicago.
Vickers, Inc., 1420 Oakman Blvd., Detroit.

PUMPS—Power
Fairbanks, Morse & Co., Chicago.
Worthington Pump & Mchry. Corp., Harrison, New Jersey.

PUMPS—Rotary
Vickers, Inc., 1420 Oakman Blvd., Detroit.

PUMPS—Steam
Fairbanks, Morse & Co., Chicago.
Worthington Pump & Mchry. Corp., Harrison, New Jersey.

PUMPS—Vacuum
Worthington Pump & Mchry. Corp., Harrison, New Jersey.

PUNCHES & DIES
Cleveland Steel Tool Co., The, 660 E. 82d St., Cleveland, Ohio.

PUNCHING AND SHEARING MACHINES
Beatty Mch. & Mfg. Co., 936—15th St., Hammond, Ind.
Bertsch & Co., Cambridge City, Ind.
Buffalo (N. Y.) Forge Co., 492 B'way.
Excelsior Tool & Mach. Co., E. St. Louis, Ill.
Ryerson, Jos. T., & Son, Inc., Chicago.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Thomas Spacing Mach. Co., Pittsburgh.

PYROMETERS—Indicating
Bristol Co., Waterbury, Conn.
Hoskins Mfg. Co., Detroit, Mich.

RAIL SPICE BARS
Ames, W., & Co., Jersey City, N. J.

RAILS
Frank, M. K., 480 Lexington Ave., N. Y. C.
Illinois Steel Co., Chicago.
Inland Steel Co., Chicago.
Robinson & Orr, Pittsburgh.
Ryerson, Jos. T., & Son, Inc., Chicago.
Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.
Weirton (W. Va.) Steel Co.

RAILS—Relaying
Hyman-Michaels Co., Chicago.
Sherwood, E. C., 7 Dey St., N. Y. C.

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Fairbanks, Morse & Co., Chicago.

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Cleveland (Ohio) Twist Drill Co.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Hartford, Conn.

REFRACTORIES
Babcock & Wilcox Co., The, 85 Liberty St., N. Y. C.
Illinois Clay Products Co., Joliet, Ill.
Massillon (Ohio) Refractories Co.

REGULATORS—Compressed Gas
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.

REINFORCEMENT FABRIC—Concrete
Pittsburgh (Pa.) Steel Co.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

RINGS—Iron or Steel
Midvale Co., The, Nicetown, Phila., Pa.

RINGS—Welded
American Welding & Mfg. Co., Warren, O.

RIVETERS—Hydro-Mechanical
Norin Engineering Co., Chicago.

RIVETERS—Squeeze
Norin Engineering Co., Chicago.

RIVET MAKING MACHINERY
Acme Machinery Co., Cleveland.
National Mchry. Co., Tiffin, Ohio.

RIVET SETS
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Norin Engineering Co., Chicago.
Shuster, F. B., Co., New Haven, Conn.

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Blake & Johnson Co., Waterville, Conn.
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Clark Bros. Bolt Co., Millidale, Conn.
Hassall, John, Inc., Clay & Oakland Sts., Bklyn, N. Y.
Oliver Iron & Steel Corp., Pittsburgh.
Progressive Mfg. Co., Torrington, Conn.
Ryerson, Jos. T., & Son, Inc., Chicago.

RODS—Aluminum
Aluminum Co. of America, Pittsburgh.

RODS—Brass
American Brass Co., Waterbury, Conn.

RODS—Magnesium Alloys
Dow Chemical Co., 921 Jefferson Ave., Midland, Mich.

RODS—Nickel Silver
Riverside (N. J.) Metal Co.
Seymour (Conn.) Mfg. Co.

RODS—Phosphor Bronze
American Brass Co., Waterbury, Conn.
Phosphor Bronze Smelting Co., Phila.
Riverside (N. J.) Metal Co.
Ryerson, Jos. T., & Son, Inc., Chicago.
Seymour (Conn.) Mfg. Co.

RODS—Welding
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
American Brass Co., Waterbury, Conn.
American Steel & Wire Co., Chicago.
Champion Rivet Co., Cleveland.
Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.
Metal & Thermit Corp., 120 B'way, N. Y. C.
Pittsburgh (Pa.) Steel Co.

RODS—Wire
American Steel & Wire Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Pittsburgh (Pa.) Steel Co.
Wickwire Brothers, Cortland, N. Y.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.
Youngstown (Ohio) Sheet & Tube Co.

ROLLING MACHINERY—Cold Rolling
Lewis Foundry & Mch. Co., Pittsburgh.
United Engineering & Fdry. Co., Ptgh.

ROLLING MACHINERY—Sheet Metal
Lewis Foundry & Mch. Co., Pittsburgh.

ROLLING MILL MACHINERY
Demag Corp., Duisburg, Germany.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Hyde Park (Pa.) Fdry. & Mch. Co.
Lewis Foundry & Mch. Co., Pittsburgh.
Mesta Mch. Co., Pittsburgh.
Morgan Engineering Co., Alliance, O.
National Roll & Fdry. Co., Avonmore, Pa.
Treadwell Engineering Co., Easton, Pa.
United Engineering & Fdry. Co., Ptgh.
Waterbury (Ct.) Farrel Fdry. & Mch. Co.

ROLLS—Alloy Steel
Pittsburgh (Pa.) Rolls Corp.

ROLLS—Bending and Straightening
Baldwin-Southwark Corp., Southwark Div., Philadelphia.
Bertsch & Co., Cambridge City, Ind.
Lake Erie Engng. Corp., 68 Kenmore Sts., Buffalo, N. Y.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.

ROLLS—Sand Chilled Iron and Steel
Hyde Park (Pa.) Fdry. & Mach. Co.
Lewis Foundry & Mch. Co., Pittsburgh.
Mesta Mch. Co., Pittsburgh.
National Roll & Fdry. Co., Avonmore, Pa.
Pittsburgh (Pa.) Rolls Corp.
United Engineering & Fdry. Co., Ptgh.

ROLLS—Special Hardened
Midvale Co., The, Nicetown, Phila., Pa.

ROOFING—Special Copper Bearing Steel
Newport (Ky) Rolling Mill Co.
Superior Sheet Steel Co., Canton, Ohio.

ROOFING AND SIDING—Corrugated and Plain
American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Pgh.
Newport (Ky.) Rolling Mill Co.
Weirton (W. Va.) Steel Co.
Youngstown (Ohio) Sheet & Tube Co.

ROOFING AND SIDING—Genuine Open Hearth Iron
Newport (Ky.) Rolling Mill Co.
Superior Sheet Steel Co., Canton, Ohio.

ROOFING AND SIDING—Iron and Steel
Newport (Ky.) Rolling Mill Co.

ROOFING AND SIDING—(Zinc) Corrugated and Plain
New Jersey Zinc Co., The, 160 Front St., N. Y. C.

RUBBER LININGS—Tank
American Hard Rubber Co., 11 Mercer St., N. Y. C.
Goodrich, B. F., Co., Akron, Ohio.

RUBBER MOLDED PARTS
American Hard Rubber Co., 11 Mercer St., N. Y. C.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.

RUST PREVENTIVES
American Chemical Paint Co., Ambler, Pa.
American Lanolin Corp., Lawrence, Mass.
Parker Rust-Proof Co., 2186 Milwaukee Ave., Detroit.

RUST PROOFING COMPOUNDS
Parker Rust-Proof Co., 2186 Milwaukee Ave., Detroit.

RUST PROOFING PROCESS
Parker Rust-Proof Co., 2186 Milwaukee Ave., Detroit.
Udylite Co., The, Detroit.

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RUST REMOVING
American Chemical Paint Co., Ambler, Pa.
Nukem Products Corp., 68 Niagara St., Buffalo.

SAND BLAST EQUIPMENT AND MACHINES
American Foundry Equipment Co., Mishawaka, Ind.
Arcade Mfg. Co., Freeport, Ill.
Pangborn Corporation, Hagerstown, Md.

SAND BLAST STEEL SHOT
American Foundry Equipment Co., Mishawaka, Ind.
Pittsburgh (Pa.) Crushed Steel Co.

SAND HANDLING EQUIPMENT
Bartlett, C. O., & Snow Co., The, Cleveland.
Jeffrey Mfg. Co., The, Columbus, Ohio.

SAWING MACHINES—Metal
Espen-Lucas Mch. Works, Phila.

SAWS—Band and Hack for Metal
Armstrong-Blum Mfg. Co., Chicago.
Atkins, E. C., & Co., Indianapolis.
Disston, Henry & Sons, Inc., Philadelphia.

SAWS—Circular, Rip & Cutoff
Atkins, E. C., & Co., Indianapolis.

SAWS—Friction
Atkins, E. C., & Co., Indianapolis.
Disston, Henry & Sons, Inc., Philadelphia.

SAWS—Hack Saw Blades
Atkins, E. C., & Co., Indianapolis.

SAWS—Hot Metal
Atkins, E. C., & Co., Indianapolis.
Disston, Henry & Sons, Inc., Philadelphia.

SAWS—Inserted Tooth, Cold
Disston, Henry & Sons, Inc., Philadelphia.
Tabor Mfg. Co., Philadelphia.

SAWS—Milling
Atkins, E. C., & Co., Indianapolis.
Disston, Henry & Sons, Inc., Philadelphia.

SCREENS—Perforated Metal
Harrington & King Perforating Co., Chi.
Hendrick Mfg. Co., Carbondale, Pa.
Mundt, Chas., & Sons, 59 Fairmount Ave., Jersey City, N. J.

SCREENS—Woven Wire
Michigan Wire Cloth Co., 2117 Howard St., Detroit.
Wickwire Brothers, Cortland, N. Y.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

SCREW MACHINE PRODUCTS
Barnes, Wallace, Co., The, Bristol, Conn.
Blake & Johnson Co., Waterville, Conn.
Cleveland (Ohio) Cap Screw Co., The.
Commonwealth Brass Corp., Detroit.
Eastern Mch. Screw Corp., New Haven, Conn.
Olson Mfg. Co., Worcester, Mass.
Ottemiller, Wm. H., Co., Inc., York, Pa.
Progressive Mfg. Co., Torrington, Conn.
Screw Mch. Products Corp., Prov., R. I.
Weatherhead Co., The, Cleveland.

SCREW MACHINERY—Automatic
Cone Automatic Mach. Co., Inc., Windsor, Vt.

SCREW MACHINERY—Hand
Jones & Lamson Mch. Co., Springfield, Vt.

SCREW MACHINERY—Multiple Spindle
Cone Automatic Mach. Co., Inc., Windsor, Vt.

SCREW STOCKS
Union Drawn Steel Co., Massillon, Ohio.

SCREWS—Cap
Bristol Co., Waterbury, Conn.
Cleveland (Ohio) Cap Screw Co., The.
Ottemiller, Wm. H., Co., Inc., York, Pa.

SCREWS—Cold Headed
Cleveland (Ohio) Cap Screw Co., The.

SCREWS—Machine
Blake & Johnson Co., Waterville, Conn.
Progressive Mfg. Co., The, Hartford, Conn.

SCREWS—Safety Set
Bristol Co., Waterbury, Conn.
Progressive Mfg. Co., The, Hartford, Conn.
Standard Pressed Steel Co., Jenkintown, Pa.
Strong, Carlisle & Hammond Co., Cleve.

SCREWS—Set
Bristol Co., Waterbury, Conn.
Ottemiller, Wm. H., Co., Inc., York, Pa.
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SCREWS, Socket, Head, Cap
Bristol Co., Waterbury, Conn.
Standard Pressed Steel Co., Jenkintown, Pa.

SCREWS—Thumb
Parker-Kalon Corp., 196 Varick St., N. Y. C.

SCRUBBING MACHINES—Sheet
Wean Engineering Co., Inc., The, Warren, Ohio.

SCYTHE STONES AND WHETSTONES
Carborundum Co., The, Niagara Falls, N. Y.

SECOND-HAND MACHINERY—See Clearing House Section
American Air Compressor Corp., 562 Hamilton Ave., Brooklyn, N. Y.
Barker-Goldman-Lubin, not Inc., Chicago.
Botwinik Brothers, Inc., New Haven, Conn.
Cincinnati (Ohio) Mchry. & Supply Co.
Donahue Steel Prods. Co., 1609 W. 74th St., Chicago.
Eastern Machinery Co., 3263 Spring Grove Ave., Cincinnati, Ohio.
Essley, E. L., Mchry. Co., Chicago.
Falk Mill Supply Co., Inc., Rochester, N. Y.
Foster, Frank B., 829 Oliver Bldg., Ptgh.
G-O Machinery & Liquidating Co., Buffalo.
Hibben & Co., Chicago.
Hill-Clarke Mchry. Co., 647 W. Washington Blvd., Chicago.
Industrial Mchry. Co., Indianapolis.
Industrial Plants Corp., 90 West Broadway, N. Y. C.
Industrial Plants Corp. of Ohio, Toledo.
Industrial Trading Corp., 227 Fulton St., N. Y. C.
Iron & Steel Products, Inc., Chicago.
Iroquois Mchry. Co., 656 Ohio St., Buffalo, N. Y.
Knox, Earl E., Co., Erie, Pa.
Lucas, J. L., & Son, Inc., Bridgeport, Conn.
McKey, Frank M., Trustee, Grigsby-Grunow Co., Inc., 5801 Dickens Ave., Chicago.
Marr-Galbreath Mchry. Co., Ptgh.
Midland Steel & Equip. Co., Chicago.
Miles Mchry. Co., Saginaw, W. S. Mich.
Noble Mchry. Co., Inc., 217 Centre St., N. Y. C.
O'Brien Machinery Co., Philadelphia.
RCA Mfg. Co., Inc., Camden, N. J.
Ritterbush & Co., Inc., 30 Church St., N. Y. C.
Ross Power Equip. Co., Indianapolis, Ind.
Safe Harbor Water Power Corp., Conestoga, Pa.
Scully-Jones & Co., Chicago.
Simmons Mch. Tool Corp., Albany, N. Y.
Sun Mchry. Co., Inc., Newark, N. J.
Sutton Eng. Co., Pittsburgh, Pa.
Thaler, Jesse, 202 Centre St., N. Y. C.
United Iron & Metal Co., Pittsburgh.
White, A. D., Mchry. Co., Chicago.

SEPARATORS—Magnetic
Dings Magnetic Separator Co., Milwaukee.
Magnetic Mfg. Co., 626 South 28th St., Milwaukee.

SHAFTING—Cold Drawn
Bliss & Laughlin, Inc., Harvey, Ill.
Union Drawn Steel Co., Massillon, Ohio.
Wyckoff Drawn Steel Co., Pittsburgh, Pa.

SHAFTING—Steel
Union Drawn Steel Co., Massillon, Ohio.

SHAFTING—Turned and Ground
Bliss & Laughlin, Inc., Harvey, Ill.
Moltrup Steel Prods. Co., Beaver Falls, Pa
Ryerson, Jos. T., & Son, Inc., Chicago.
Union Drawn Steel Co., Massillon, Ohio.
Wyckoff Drawn Steel Co., Pittsburgh, Pa.

SHAPES—Cold Drawn
Bliss & Laughlin, Inc., Harvey, Ill.
Union Drawn Steel Co., Massillon, Ohio.
Wyckoff Drawn Steel Co., Pittsburgh, Pa.

SHAPES—Wire
Eastern Tool & Mfg. Co., Bloomfield, N. J.
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.
Roebling's, John A., Sons Co., Trenton, N. J.
Titchener, E. H., & Co., Binghamton, N. Y.

SHAPING MACHINES—Vertical
Pratt & Whitney Co., Hartford, Conn.

SHEARING MACHINES—Alligator
Canton (Ohio) Fdry. & Mch. Co.

SHEARING MACHINES—Angle, Hand and Power
Buffalo (N. Y.) Forge Co., 492 Broadway.
Federal Bearings Co., Inc., Poughkeepsie, N. Y.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.

SHEARING MACHINES—Bar
Buffalo (N. Y.) Forge Co., 492 Broadway.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
United Engineering & Fdry. Co., Ptgh.

SHEARING MACHINES — Beam and Channel
Buffalo (N. Y.) Forge Co., 492 Broadway.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
United Engineering & Fdry. Co., Ptgh.

SHEARING MACHINES—Billet
Buffalo (N. Y.) Forge Co., 492 Broadway.
Morgan Engineering Co., Alliance, Ohio.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
United Engineering & Fdry. Co., Ptgh.

SHEARING MACHINES, Plate
Bertsch & Co., Cambridge City, Ind.
Buffalo (N. Y.) Forge Co., 492 Broadway.
Dreis & Krump Mfg. Co., Chicago.
Mesta Mch. Co., Pittsburgh.
Morgan Engineering Co., Alliance, O.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
United Engineering & Fdry. Co., Ptgh.

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Buffalo (N. Y.) Forge Co., 492 Broadway.
Dreis & Krump Mfg. Co., Chicago.

SHEARING MACHINES—Squaring
Dreis & Krump Co., Chicago.
Niagara Mach. & Tool Wks., Buffalo, N. Y.

SHEET BARS
Andrews Steel Co., The, Newport, Ky.
Jones & Laughlin Steel Corp., Pittsburgh.

SHEET METAL MACHINERY
Dreis & Krump Mfg. Co., Chicago.
New Albany (Ind.) Mch. Mfg. Co.
Niagara Mach. & Tool Wks., Buffalo, N. Y.
Ryerson, Jos. T. & Son, Inc., Chicago.
V & O Press Co., Hudson, N. Y.

SHEETS—Aluminum
Aluminum Co. of America, Pittsburgh.

SHEETS—Auto Body
American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Pgh.
Inland Steel Co., Chicago.
Republic Steel Corp., Youngstown, Ohio.
Weirton (W. Va.) Steel Co.
Youngstown (Ohio) Sheet & Tube Co.

SHEETS—Black
American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Pgh.
Granite City (Ill.) Steel Co.
Ingersoll Steel & Disc Co., Chicago.
Inland Steel Co., Chicago.
Newport (Ky.) Rolling Mill Co.
Republic Steel Corp., Youngstown, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Superior Sheet Steel Co., Canton, Ohio.
Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.
Weirton (W. Va.) Steel Co.
Worth Steel Co., Claymont, Del.

SHEETS—Blue Annealed
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American Rolling Mill Co., Middletown, O.

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Riverside (N. J.) Metal Co.
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SHEETS—Chrome Nickel
American Sheet & Tin Plate Co., Ptgh.

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STEEL—Cold Rolled Strips, Electro Tin Coated
Thomas Steel Co., Warren, Ohio.

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Milne, A., & Co., 745 Washington St., N. Y. C.
Pacific Coast Steel Corp., San Francisco, Calif.
Universal Steel Co., Bridgeville, Pa.

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West Leechburg Steel Co., Pittsburgh.

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Thomas Steel Co., Warren, O.

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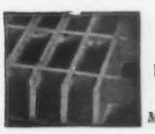

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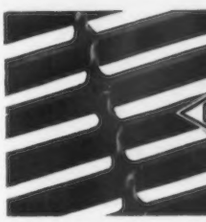

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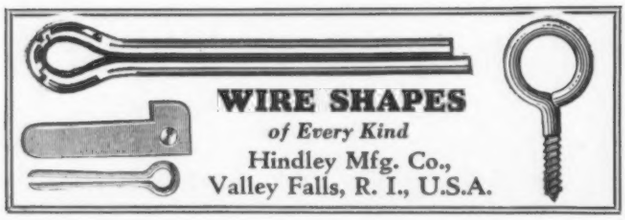

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Illinois Steel Co., Chicago.
Inland Steel Co., Chicago.
Weirton (W. Va.) Steel Co.

TIES—BALE
American Steel & Wire Co., Chicago.

TIN PLATE
American Sheet & Tin Plate Co., Ptgh.
Granite City (Ill.) Steel Co.
Jones & Laughlin Steel Corp., Pittsburgh.
Pacific Coast Steel Corp., San Francisco, Calif.
Republic Steel Corp., Youngstown, O.
Weirton (W. Va.) Steel Co.
Youngstown (Ohio) Sheet & Tube Co.

TIN PLATE MACHINERY
Wean Engineering Co., Inc., The, Warren, Ohio.

TINNING EQUIPMENT—Sheets
Wean Engineering Co., Inc., The, Warren, Ohio.

TIRE SETTING MACHINES
Davis Keyseater Co., 400 Exchange St., Rochester, N. Y.

TOOL BITS
Carboloy Co., Inc., 2985 E. Jefferson Ave., Detroit.
Carpenter Steel Co., 121 W. Bern St., Reading, Pa.

TOOL HOLDERS
Armstrong Bros. Tool Co., Chicago.

TOOLS—Lathe
Armstrong Bros. Tool Co., Chicago.
Carboloy Co., Inc., 2985 E. Jefferson Ave., Detroit.

TOOLS—Metal Cutting
Carboloy Co., Inc., 2985 E. Jefferson Ave., Detroit.
Pratt & Whitney Co., Hartford, Conn.

TOOLS—Tungsten Carbide
Carboloy Co., Inc., 2985 E. Jefferson Ave., Detroit.

TORCHES—Brazing, Cutting and Welding
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.
Weldit Acetylene Co., Detroit.

TRACTORS AND TRAILERS — See Trucks, Tractors and Trailers—Industrial

TRAILERS—Industrial—See Trucks, Tractors and Trailers—Industrial

TRAMRAILS—Overhead Systems
Cleveland Tramrail, Wickliffe, Ohio.
Louden Mchry. Co., Fairfield, Iowa.

TRAMWAYS—Wire Rope
American Steel & Wire Co., Chicago.
Leschen, A., & Sons Rope Co., St. Louis, Mo.

TRANSMISSIONS—Hydraulic
Oilgear Co., The, 1311 W. Bruce St., Milwaukee.
Vickers, Inc., 1420 Oakman Blvd., Detroit.

TREADS—Safety
Blaw-Knox Co., Pittsburgh.
Central Iron & Steel Co., Harrisburg, Pa.
Hendrick Mfg. Co., Carbondale, Pa.
Norton Co., Worcester, Mass.

TRUCKS—Elevating (Power)
Elwell-Parker Electric Co., The, Cleveland.
Yale & Towne Mfg. Co., Stamford, Conn.

TRUCKS—Lift (Hand & Foot)
Yale & Towne Mfg. Co., Stamford, Conn.

TRUCKS, TRACTORS AND TRAILERS—Industrial
Atlas Car & Mfg. Co., Cleveland.
Elwell-Parker Electric Co., The, Cleveland.
Yale & Towne Mfg. Co., Stamford, Conn.

TUBE MILL MACHINERY
Treadwell Engineering Co., Easton, Pa.
United Engineering & Fdry. Co., Ptgh.

TUBES—Boiler
National Tube Co., Pittsburgh.
Pittsburgh (Pa.) Steel Co.

TUBES—Boiler, Charcoal Iron
Reading Iron Co., Philadelphia.

TUBES—High Carbon
Steel & Tubes, Inc., Cleveland.

TUBES—Nickel Silver
American Brass Co., Waterbury, Conn.

TUBES—Stainless Steel
National Tube Co., Pittsburgh.

TUBING—Aluminum Seamless
Aluminum Co. of America, Pittsburgh.

TUBING—Flexible Metallic
Bissett Steel Co., The, Cleveland.

TUBING—Hard Rubber
American Hard Rubber Co., 11 Mercer St., N. Y. C.

TUBING—Magnesium Alloys
Dow Chemical Co., 921 Jefferson Ave., Midland, Mich.

TUBING—Nichrome
Steel & Tubes, Inc., Cleveland.

TUBING—Open Seam
Steel & Tubes, Inc., Cleveland.

TUBING—Phosphor Bronze
American Brass Co., Waterbury, Conn.
Phosphor Bronze Smelting Co., Phila.

TUBING—Rubber
Goodrich, B. F., Co., Akron, Ohio.

TUBING—Seamless Steel
National Tube Co., Pittsburgh.
Pittsburgh (Pa.) Steel Co.
Steel & Tubes, Inc., Cleveland.
Timken Roller Bearing Co., Canton, Ohio.
Timken Steel & Tube Co., The, Canton, O.
Youngstown (Ohio) Sheet & Tube Co.

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Steel & Tubes, Inc., Cleveland.

TUBING—Stainless Steel
Steel & Tubes, Inc., Cleveland.

TUBING—Tool Steel
Bissett Steel Co., The, Cleveland.

TUBING—Welded Steel
National Tube Co., Pittsburgh.
Steel & Tubes, Inc., Cleveland.
Youngstown (Ohio) Sheet & Tube Co.

TUBULAR PRODUCTS
National Tube Co., Pittsburgh.
Steel & Tubes, Inc., Cleveland.
Wallace Supplies Mfg. Co., Chicago.

TUMBLING BARRELS—See Barrels—Tumbling

TUNGSTEN CARBIDE
Carboloy Co., Inc., 2985 E. Jefferson Ave., Detroit.

TURBO-COMPRESSORS
Spencer Turbine Co., Hartford, Conn.

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TURNTABLES
American Bridge Co., Pittsburgh.

TURNTABLES—Industrial
Canton (Ohio) Fdry. & Mch. Co.

TWIST DRILLS
Cleveland (Ohio) Twist Drill Co.
Morse Twist Drill & Mch. Co., New Bedford, Mass.

TYPE—Steel
Noble & Westbrook Mfg. Co., East Hartford, Ct.

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Central Forging Co., The Catawissa, Pa.
Dart, E. M., Mfg. Co., Prov., R. I.

VALVE DISCS
Garlock Packing Co., The, Palmyra, N. Y.

VALVES—Acid Resisting
Duriron Co., Inc., The, 438 N. Findlay St., Dayton, Ohio.

VALVES—Air
Murdock Mfg. & Supply Co., The, Cincinnati.

VALVES—Air Operating
Westinghouse Air Brake Co., Industrial Div., Pittsburgh.

VALVES—Gas, Water and Steam
Jarecki Mfg. Co., Erie, Pa.
Wood, R. D., Co., Philadelphia.

VALVES—Hydraulic
Baldwin-Southwark Corp., Southwark Div., Philadelphia.
Vickers, Inc., 1420 Oakman Blvd., Detroit.
Wood, R. D., Co., Philadelphia.

VALVES—Pump, Rubber
Garlock Packing Co., The, Palmyra, N. Y.

VARNISH—Acid Resisting
Nukem Products Corp., 68 Niagara St., Buffalo.

VISES
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Central Iron & Steel Co., Harrisburg, Pa.
Smith, Thomas, Co., 286 Grove St., Worcester, Mass.

WASHERS—Leather
Chicago (Ill.) Rawhide Mfg. Co., 1306 Elston Ave.
Schieren, Chas. A., Co., 30 Ferry St., N. Y. C.

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Scaife, Wm. B., & Sons Co., Ptgh.

WELDING—Electric
Thomson-Gibb Elec. Welding Co., Lynn, Mass.
Westinghouse Elec. & Mfg. Co., East Ptgh.

WELDING—Thermic
Metal & Thermit Corp., 120 B'way, N. Y. C.

WELDING AND CUTTING MACHINES AND EQUIPMENT—Oxy-Acetylene
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.
Weldit Acetylene Co., Detroit.

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Harnischfeger Corp., 4401 W. National Ave., Milwaukee.

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Thomson-Gibb Elec. Welding Co., Lynn, Mass.

WELDING MACHINES—Electric Arc
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., Cleveland.
Westinghouse Elec. & Mfg. Co., East Ptgh.

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Goodman Elec. Mchry. Co., Newark, N. J.

WELDING MACHINES—Flash
Thomson-Gibb Elec. Welding Co., Lynn, Mass.

WELDING MACHINES—Press
Thomson-Gibb Elec. Welding Co., Lynn, Mass.

WELDING MACHINES—Seam
Thomson-Gibb Elec. Welding Co., Lynn, Mass.

WELDING MACHINES—Spot
Eisler Engineering Co., Inc., 754 S. 13th St., Newark, N. J.
Thomson-Gibb Elec. Welding Co., Lynn, Mass.

WHEELS—Rolled Steel
Carnegie Steel Co., Pittsburgh.
Illinois Steel Co., Chicago.

WIRE—Aluminum
Aluminum Co. of America, Pittsburgh.

WIRE—Barb
Jones & Laughlin Steel Corp., Pittsburgh.
Pittsburgh (Pa.) Steel Co.

WIRE—Brass, Bronze, Copper, Nickel, Silver or Phosphor Bronze
Michigan Wire Cloth Co., 2117 Howard St., Detroit.
Phosphor Bronze Smelting Co., Phila.
Riverside (N. J.) Metal Co.
Seymour (Conn.) Mfg. Co.

WIRE—Electric Heat Resisting
Globar Corp., Niagara Falls, N. Y.

WIRE—Flat, Round, Square or Special Shapes
American Steel & Wire Co., Chicago.
Barnes, Wallace, Co., The, Bristol, Conn.
New England High-Carbon Wire Co., Millbury, Mass.
Pacific Coast Steel Corp., San Francisco, Calif.
Page Steel & Wire Co., Monessen, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Seneca Wire & Mfg. Co., The, Fostoria, Ohio.
Webb Wire Works, New Brunswick, N. J.
Wickwire Bros., Cortland, N. Y.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

WIRE—High Carbon
New England High-Carbon Wire Co., Millbury, Mass.

WIRE—Insulated
American Steel & Wire Co., Chicago.
Roebling's, John A., Sons Co., Trenton, N.J.

WIRE—Mattress
American Steel & Wire Co., Chicago.
Roebling's, John A., Sons Co., Trenton, N. J.

WIRE, Netting
Roebling's, John A., Sons Co., Trenton, N. J.
Wickwire Brothers, Cortland, N. Y.

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New England High-Carbon Wire Co., Millbury, Mass.
Webb Wire Works, New Brunswick, N. J.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

WIRE—Special, Drawn Shapes
Rathbone, A. B. & J., Palmer, Mass.

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Seneca Wire & Mfg. Co., The, Fostoria, Ohio.

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Jones & Laughlin Steel Corp., Pittsburgh.
New England High-Carbon Wire Co., Millbury, Mass.
Pittsburgh (Pa.) Steel Co.
Roebling's, John A., Sons Co., Trenton, N. J.
Seneca Wire & Mfg. Co., The, Fostoria, Ohio.

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Page Steel & Wire Co., Monessen, Pa.

WIRE—Steel
Wickwire Brothers, Cortland, N. Y.

WIRE—Welding
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American Steel & Wire Co., Chicago.
Lincoln Electric Co., Cleveland.
Metal & Thermit Corp., 120 B'way, N. Y. C.
Page Steel & Wire Co., Monessen, Pa.
Pittsburgh (Pa.) Steel Co.
Roebling's, John A., Sons Co., Trenton, N. J.
Seneca Wire & Mfg. Co., The, Fostoria, Ohio.
Wickwire Brothers, Cortland, N. Y.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

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Wickwire Bros., Cortland, N. Y.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

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WIRE FORMING MACHINERY
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Nilson, A. H., Mach. Co., Bridgeport, Ct.

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Hindley Mfg. Co., Valley Falls, R. I.
Pittsburgh (Pa.) Steel Co.
Titchener, E. H., & Co., Binghamton, N. Y.
U. S. Steel Wire Spring Co., Cleveland, O.
Wickwire Bros., Cortland, N. Y.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

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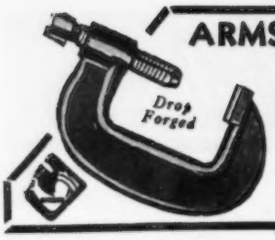

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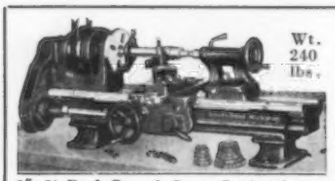

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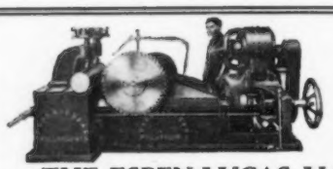

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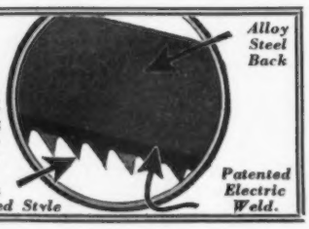

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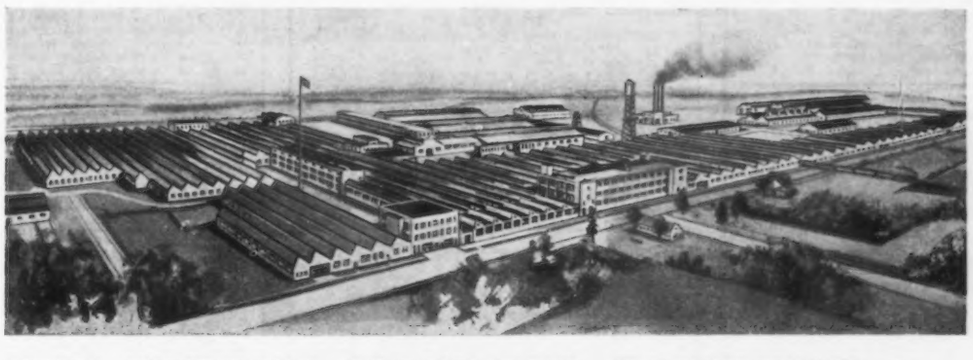

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20"x120", Landis, plain, M.D.
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No. 33 Abrasive vert. surf.
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No. 3-B, No. 4-B Milwaukee, plain
No. 4 Cincinnati, plain, high power
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The Iron Age

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OF EVERY DESCRIPTION
SMALLEST UP TO 2¼"
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TREASURY DEPARTMENT, Procurement Division, Public Works Branch, Washington, D. C., Mar. 16, 1935.—Sealed bids in duplicate will be publicly opened in this office at 1 p.m. Apr. 10, 1935, for furnishing all labor and materials and performing all work for the construction of the U.S.P.O. at Montgomery, W. Va. Attention is directed to the special conditions of bidding set forth in the specifications, and Bulletin No. 51 of the Federal Emergency Administration of Public Works and Executive Order No. 6646. Drawings and specifications, not exceeding 2 sets, may be obtained at this office in the discretion of the Assistant Director of Procurement, Public Works Branch, by any general contractor, and provided a deposit of $15 is made for each set to assure its prompt return. One set will be furnished builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any subcontractor or material firm interested, and to quantity surveyors, provided a deposit of $15 is made to assure its prompt return. Checks offered as deposits must be made payable to the order of the Treasurer, U.S. Cash deposits will not be accepted. W. E. Reynolds, Assistant Director of Procurement, Public Works Branch.

TREASURY DEPARTMENT, Procurement Division, Public Works Branch, Washington, D. C. Mar. 11, 1935—Sealed bids in duplicate, will be publicly opened in this office at 1 p. m., Apr. 8, 1935, for furnishing all labor and materials and performing all work for construction of the U. S. Insp. Sta. at Sweetgrass, Mont. Attention is directed to the special conditions of bidding set forth in the specifications, and Bulletin No. 51 of the Federal Emergency Administration of Public Works and Executive Order No. 6646. Drawings and specifications, not exceeding 3 sets, may be obtained at this office in the discretion of the Assistant Director of Procurement, Public Works Branch, by any general contractor, and provided a deposit of $15 is made for each set to assure its prompt return. One set will be furnished builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any subcontractor or material firm interested, and to quantity surveyors, provided a deposit of $15 is made to assure its prompt return. Checks offered as deposits must be made payable to the order of the Treasurer, U. S. Cash deposits will not be accepted. W. E. Reynolds, Assistant Director of Procurement, Public Works Branch.

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East Engin. Library

MAR 28 1935

THE IRON AGE

MARCH 28, 1935

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2 to 3 times faster in production ' ' ' roughs twice as many pinions per sharpening of cutter ' ' ' reduces machine attendance two-thirds.

EASON WORKS
OCHESTER, N. Y., U. S. A.

15
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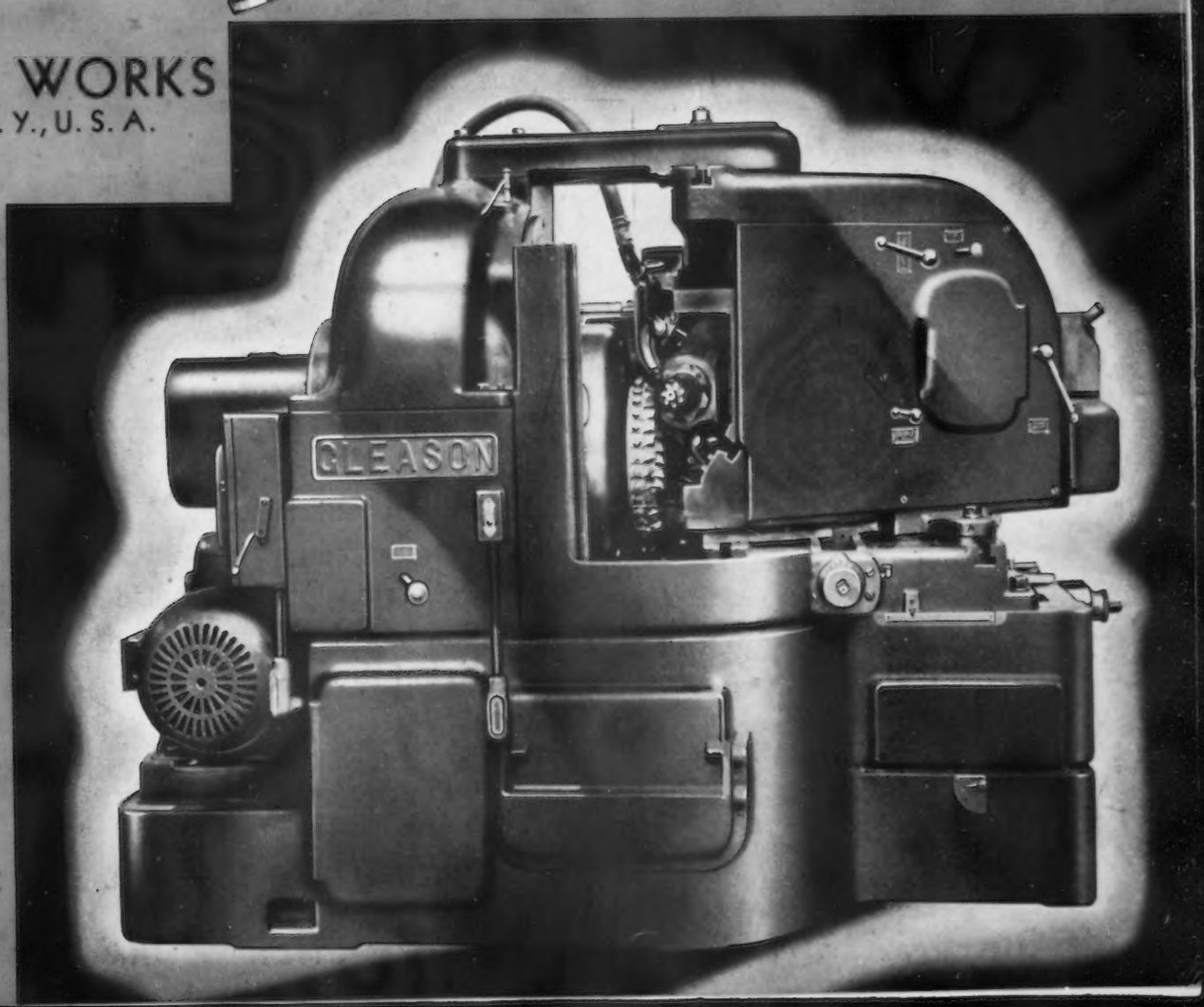

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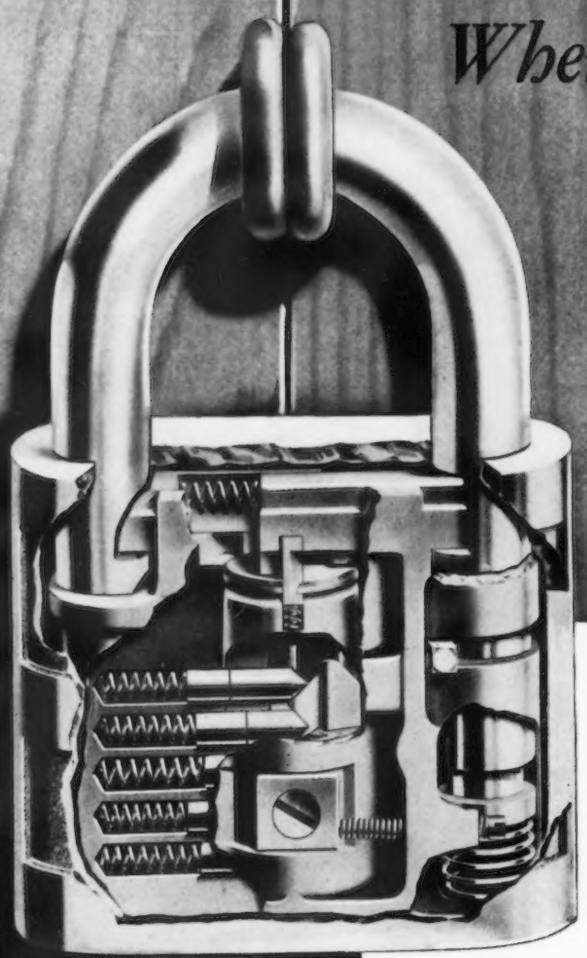

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THE PHOSPHOR BRONZE SMELTING CO.

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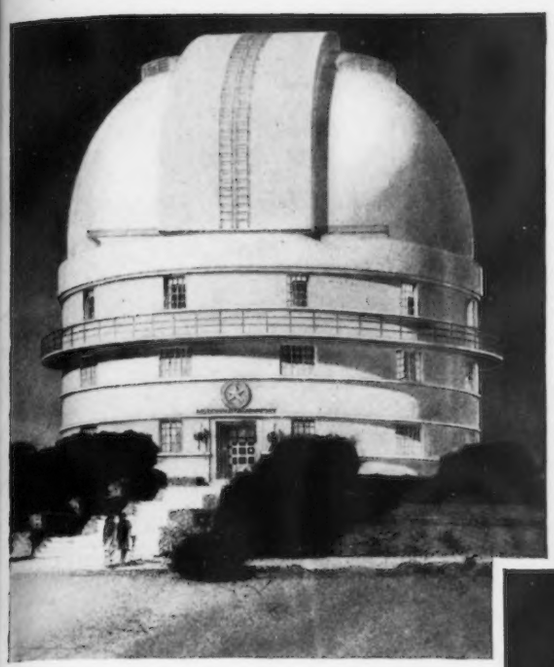

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Astronomical Accuracy for Machine Tools

THERE is no finer example of precision construction than the modern astronomical telescope. These complicated instruments, although weighing many tons, operate with greater accuracy than the finest watch as they automatically and constantly follow the heavenly bodies in their courses.

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THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN *TAPERED ROLLER* BEARINGS

This

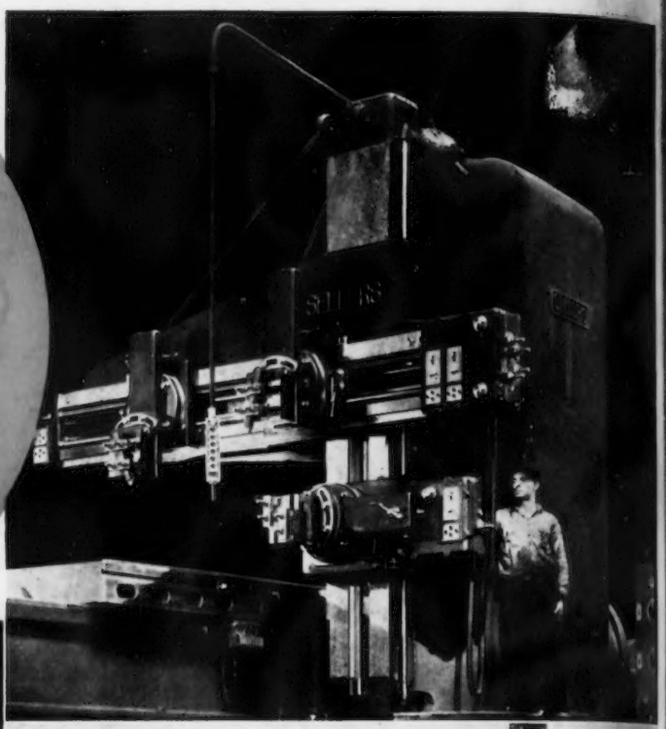
GIANT PLANER

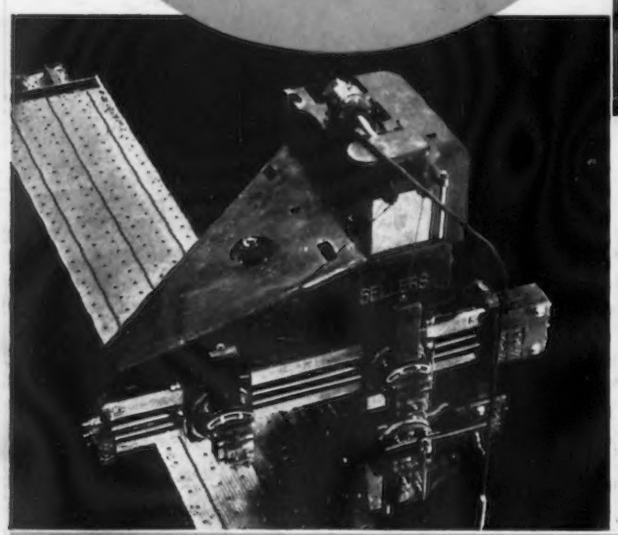
... another

Stearns

Magnetic Clutch

Application





Stearns High Duty Magnetic Clutches control the operations of this planer . . . the largest of its kind ever built.

HIGH STEARNS DUTY

MAGNETIC CLUTCHES

SIMPLICITY, automatic operation and positive, accurate remote control are the requirements of modern machine design.

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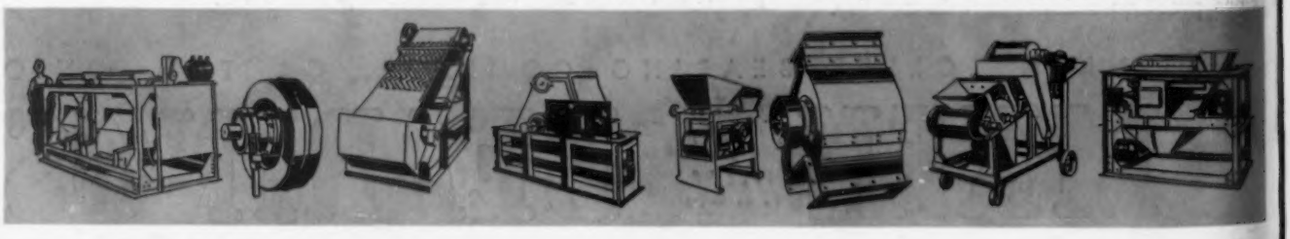
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